

Great Lakes Water Supply Program



DRAFT 4-220 D4 Geotechnical Soil Analysis Technical Memorandum

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PROGRAM TEAM MEMBER CONSULTANTS:



EXECUTIVE SUMMARY

This technical memorandum evaluates Route Alternatives M1, M2, and M3 of the Water Supply Pipeline for the Great Water Alliance (Program). The Study Area for this technical memorandum includes three route alternatives being considered for the Water Supply Pipeline for Contract Packages 2 and 6.

The results of the technical memorandum based upon anticipated geotechnical issues along these alignments are summarized in **Table B-ES-1**. Different values are provided for different pipe materials being considered, based on different corrosive conditions for ductile iron pipe (DIP) / steel pipe, pre-stressed concrete cylinder pipe (PCCP), and polyvinyl chloride (PVC) / high-density polyethylene (HDPE) materials. The total score for each of the route alternatives, and each of the pipe materials, is also included, with the higher scores being more preferable due to a lower amount of risk deductions. A detailed description of the route alternatives, references utilized, and decision process, is presented in this technical memorandum.

Table B-ES-1 Summary of Total Scores to Route Alternatives M1, M2 and M3

Route Alternative	Ranking	Total Score		
		Steel Pipe/ DIP	PCCP	PVC/HDPE
Route M1	Second Most Preferred	13,612	17,641	17,684
Route M2	Preferred	14,519	19,356	19,356
Route M3	Least Preferred	-13,288	-8,819	-8,819

Based on the total scores presented in this technical memorandum, Route Alternatives M1 and M2 are comparable from a geotechnical perspective, while Route Alternative M3 is less preferable. The anticipated lengths of pipeline within areas of shallow bedrock, the dense soils anticipated along Racine Avenue, and the lengths of the horizontal directional drilling (HDD) and casing areas were the major contributors to the risk values for Route Alternative M3.

SECTION 1 Introduction

1.1 Program Description

The Great Water Alliance (Program) consists of the installation of a new Water Supply Pipeline to supply water from Lake Michigan to the City of Waukesha (Waukesha), and a Return Flow Pipeline to return highly treated effluent from the Clean Water Plant (CWP) to the Root River in Milwaukee County. The Water Supply Pipeline will begin at the anticipated connection to the Milwaukee Water Works' Distribution System (MWW's) at the intersection of 60th Street and Howard Avenue in the City of Milwaukee (Milwaukee) to the Waukesha Water Utility's (WWU's) distribution system at the intersection of Sunset Drive and Route 59. The Return Flow Pipeline will run from the CWP to the Root River in the City of Franklin.

The pipelines are being designed as three contract packages:

- Contract Package 2: Water Supply Pipeline (exclusive of the Common Corridor, of the corridor containing both the Water Supply and Return Flow Pipelines)
- Contract Package 5: Return Flow Pipeline (exclusive of the Common Corridor, including the outfall facilities to the Root River)
- Contract Package 6: Common Corridor Pipeline

This technical memorandum evaluates three route alternatives for the Water Supply Pipeline (Contract Packages 2 and 6). Evaluation of the Return Flow Pipeline (Contract Package 5) is presented in the separate technical memorandum submitted as part of the Route Study: Oak Creek (DEL 4-100 D1). The route alternatives for the Water Supply Pipeline and the Return Flow Pipeline overlap along Racine Avenue and Sunset Drive in Waukesha County. The length of the Water Supply Pipeline for the entire Program is approximately 13 miles.

Pipe materials being evaluated by the Program team include ductile iron pipe (DIP), steel pipe, pre-stressed concrete cylinder pipe (PCCP), polyvinyl chloride (PVC) pipe and high-density polyethylene (HDPE) pipe. The majority of the alignment is expected to use open cut excavation with trench depths as described in **Table B-1-1**. The Water Supply Pipeline is expected to be connected to a WSPS, water storage reservoir, and a Booster Pumping Station (BPS). Evaluation of these facilities is not a part of the scope of work for this technical memorandum.

Table B-1-1 lists the estimated parameters that are the basis for the analysis performed:

Table B-1-1 Assumed Design Parameters Used for Analysis

Design Parameter	Value
Pipe material	Steel pipe, DIP, PCCP, PVC, or HDPE
Invert depth of Water Supply Pipeline	9 and 11.5 feet for rural and urban areas, respectively
Water Supply Pipe diameter	30 inches outside diameter
Water Supply and Return Flow Pipeline separation distance	Minimum of 8 feet center to center or 5 feet wall to wall
Bedding under pipe	Minimum of 6 inches

Table B-1-2 Assumed Design Parameters Used for Analysis (continued)

Design Parameter	Value
Water Supply Pipeline trench width	Minimum of 5 feet
Backfill depth of Select Fill	Minimum of 1 foot above pipe
Type of backfill above Select Fill	Slurry Backfill or Select Fill, and Common Fill for pavement and landscapes areas, respectively

A summary of the trenchless excavation lengths, and the route alternative each trenchless excavation is present on, is included in **Appendix B-5**. Trenchless installation methods at most roadway crossings are expected to be via jack and bore (casing). Horizontal directional drilling (HDD) is expected for major roadway, freeway, and river crossings. The areas of casing require auger boring where an entry and exit pit are excavated at either end of the obstruction. Hollow augers are attached to a lead cutting head on one end and the boring machine on the other. The auger string is rotated, creating a hole whereby the auger string can be advanced by hydraulic jacks.

HDD is a steerable drilling process where the direction of the bit advancement can be controlled and can be monitored throughout the process to determine the path of the drill bit. An inclined surface rig first drills a small pilot hole with a drilling fluid that helps remove cuttings and stabilize the hole. The hole is then reamed to a diameter of 120% to 150% of the outside diameter of the pipe to be installed to allow for the curvature of the pipe and to allow for the return of spoils within the annular space. After reaming, the product pipe is attached to the drill pipe at the opposite end of the drill and pulled back through the hole. In order to preclude caving of the tunnel roof, prudent care must be taken when casing or performing HDD to provide for the presence of sufficient soil materials above the crown of the excavation or above waterways or culvert structures. Difficult HDD/Casing efforts may be encountered where large cobbles, boulders, very dense soils, or bedrock are present.

The anticipated trench backfill specifications are attached in **Appendix B-2**. Where installation is performed within pavement areas, the cross sections provided show that Select Fill will be used to backfill the pipe to a minimum of one foot above the top of the pipe, followed by Select Fill (slurry backfill) up to the bottom of the existing pavement section. Below landscaped areas, Select Fill will be used to backfill to a minimum of one foot above the pipe followed by Common Fill. Select Fill would be compacted to at least 95% of maximum dry density, as specified by the Modified Proctor (ASTM D1557), while Common Fill would be compacted to at least 90% of maximum dry density (ASTM D1557). Material excavated from the trench will be used as Common Fill if it is found to be suitable. Preliminary specifications indicate that Common Fill should have a Liquid Limit (LL) less than or equal to 40 and a Plasticity Index (PI) less than or equal to 20. Where the Water Supply and Return Flow Pipelines are in the Common Corridor, they will have a minimum horizontal separation of eight feet center to center, or five feet wall to wall.

Parameters which are unknown at this time and, therefore, not factored into the analysis include:

- The specific invert elevations of the Water Supply Pipeline along each route alternative;
- Sources and haul distance of the Select Fill material;
- Because the exact location within the right-of-way and proposed easements is not known and plans are not fully developed, the analysis does not evaluate potential conflicts with existing overhead and underground utilities. While consideration is given to what materials may be suitable for Select Fill or Common Fill, this

technical memorandum also does not evaluate which specific areas are below the pavement or outside the pavement.

The material used as fill within any embankment areas along the alignment were not evaluated, as mapping tools are only available for natural soils. Additionally, environmental impacts are not factored into this technical memorandum, as those issues are being evaluated by others on the Program team.

1.2 Objectives of this Technical Memorandum

Primary Objective

The primary purpose of this technical memorandum is to offer the means to estimate the various geotechnical risks associated with each of the route alternatives using available references and local knowledge, in order to help decide the most favorable route alternative of the Water Supply Pipeline. The Study Area for this technical memorandum is the Water Supply Pipeline within Milwaukee and Waukesha Counties. This analysis does not include the area of proposed pumping stations or reservoirs.

The three route alternatives are designated as Route Alternatives M1, M2 and M3. In Milwaukee County, Route Alternatives M2 and M3 share the same alignment, and they follow different alignments in Waukesha County. The individual route alternatives are assigned a score based on anticipated geotechnical conditions. The route alternative with the higher score is deemed the more favorable route alternative for the section studied from a geotechnical standpoint.

Secondary Objectives

Secondary goals of this technical memorandum are to develop a preliminary characterization of subsurface conditions to allow a better understanding of the subsurface challenges that will likely be encountered. This knowledge can help guide the investigation plan in highlighting areas where more concentrated field investigations or specific sampling methods will be important. This technical memorandum can aid in developing an efficient investigation that considers risk elements in advance of the field work.

1.3 Regional Geology

In Milwaukee County, the Study Area is underlain by bedrock of Silurian age that consists of dolomites mainly of the Racine Formation with small transects through the Waukesha Formation and the Kankakee Equivalent. The dolomite is fine- to medium-grained and thin- to medium-bedded with locally cherty and fossiliferous areas. These units are considered to be competent and are quarried in areas where they near the surface for construction aggregates. The area is overlain mostly by silty till of the Oak Creek Formation which formed from lacustrine silts and clays redeposited by the Lake Michigan Lobe of the Laurentide Ice Sheet. Occasional meltwater stream deposits of sand and gravel exist below the surface.

The Waukesha County area is underlain by bedrock of Silurian age that consists of dolomites of the Racine, Waukesha, and Kankakee Equivalent Formations. The dolomite is fine- to medium-grained and thin- to medium-bedded with locally cherty and fossiliferous areas. These units are considered to be competent and are commonly quarried for construction aggregates. The thinnest glacial deposits, 20 feet thick or less, are found along an approximately six-mile wide band traversing Waukesha County in a northeast direction from the Village of Eagle to the Villages of Lannon and Menomonee Falls. This band passes through the north half of Waukesha.

The Waukesha County area is mainly overlain by Pleistocene glacial deposits. The glacial deposits consist of sandy till of the Holy Hill Formation which formed from more northern material brought down by the Green Bay Lobe of the

Laurentide Ice Sheet, as well as sandy/gravelly deposits formed by braided meltwater streams. These soils can include dense layers with gravel and cobbles resulting in a difficult excavation environment.

1.4 Sources Referenced

The US Department of Agriculture/ Natural Resources Conservation Service (USDA/NRCS) Web Soil Survey was reviewed for indications of organic soils, potential for aggressive ground chemistry, dense soil layers and high water table. A summary table of the soil units along the Study Area and their individual characteristics is included in **Appendix B-6**. Detailed maps along the potential alignments showing the locations of the individual soil units are included in **Appendix B-7**. The high water table information presented includes “apparent” groundwater and “perched” groundwater. Apparent groundwater represents a regional groundwater level which generally cannot be drained, while perched groundwater is generally pockets of water trapped within granular layers or within near surface soils on top of relatively impermeable clay. Additional information obtained from the USDA/NRCS Web Soil Survey includes estimated LL and PI for consideration of suitability for use as Common Fill.

Southeast Wisconsin Regional Planning Commission (SEWRPC) data was evaluated for depth to bedrock, and was used to aid in evaluating the water table information from the USDA/NRCS Web Soil Survey.

The Wisconsin Department of Transportation’s Highway Structures Information (WisDOT HSI) system was reviewed for bridge, culvert, and other structure borings along the alignment. The location of relevant borings in the area are shown on the drawings in **Appendix B-1**, and labeled “HSI Data”. The boring sheets for these locations are attached in **Appendix B-11**.

Water well records were reviewed for those areas where the SEWRPC Depth to Bedrock Map indicated areas of shallow bedrock near the route alternatives. The areas searched included Sections 20 and 28 of T6N R20E, and Section 20 of T6N R21 E. The records were searched in the Wisconsin Department of Natural Resources (WDNR) online database of Well Construction Reports (wells constructed since 1987 for private homeowners). Water wells constructed prior to 1987 were also reviewed. A summary of these wells near the route alternatives is included in **Appendix B-12**. In Section 28 T6N R20E, bedrock less than 25 feet below grade was identified in 14 water wells near the intersection of Beloit Road and National Avenue (near Route Alternative M3). Copies of these logs are included in **Appendix B-13**.

The Milwaukee Metropolitan Sewerage District (MMSD) database was reviewed for bridge, culvert, and other structure borings along the alignment. The location of relevant borings in the area are shown on the drawings in **Appendix B-1**, and labeled “MMSD Data”. The boring sheets for these locations are attached in **Appendix B-14**.

GESTRA’s internal records of past projects were reviewed to evaluate if the previous borings conflict with the mapping information described above, and to identify potential sources of information which can assist in the development of an exploration plan. In 2015, GESTRA performed a geotechnical exploration for 60th Street that includes the intersection of 60th Street and Howard Avenue. Permission to use information from this project has been obtained from the client, and relevant information from that project is presented in **Appendix B-15**.

Soil borings have been completed along a portion of the route alternatives (along Racine Avenue) by others on the Program team. Selected soil borings logs prepared by PSI as part of the Program have been reviewed and are included in **Appendix B-16**.

SECTION 2 Route Alternatives Evaluated

2.1 Route Alternative M1

Route Alternative M1 is the northernmost route alternative. It begins at the intersection of 60th Street and Howard Avenue and proceeds west on Howard Avenue to 68th Street where it turns north and follows 68th Street, Honey Creek Drive and 76th Street to the intersection of 76th Street and Oklahoma Avenue. From the intersection of 76th Street and Oklahoma Avenue, Route Alternative M1 runs west along Oklahoma Avenue for approximately 2.5 miles, at which point Oklahoma Avenue becomes National Avenue. The route alternative then proceeds west along National Avenue approximately 2.5 miles to the intersection of National Avenue and Coffee Road. The route alternative continues west along Coffee Road to the intersection of Coffee Road and Swartz Road, where the route alternative proceeds south to the intersection of Swartz Road and Racine Avenue. Figures showing the route alternatives are attached in **Appendix B-1**.

Beginning at the intersection of Swartz Road and Racine Avenue, all three route alternatives follow the same alignment. At this point, the route alternatives head northwest to the intersection of Racine Avenue and Sunset Drive, where the route alternatives head west to the connection with WWU's distribution system in the vicinity of the intersection of Route 59 and Sunset Drive.

There are several areas of casing and HDD planned along Route Alternative M1, as shown in **Appendix B-5**. Casing is planned at a total of 17 roadway crossings. HDD is planned at five waterway crossings and one roadway crossing. The remainder of Route Alternative M1 is expected to be open cut.

2.2 Route Alternative M2

Route Alternative M2 begins at the intersection of 60th Street and Howard Avenue and proceeds west on Howard Avenue approximately 1,250 feet where it turns and follows Forest Home Avenue southwest about 4,000 feet to the intersection of Forest Home Avenue and Cold Spring Road. Route Alternative M2 follows Cold Spring Road to the west approximately 4.3 miles to Sunnyslope Road. After crossing Sunnyslope Road, the route alternative enters a proposed easement on New Berlin Eisenhower High School property. The route alternative then connects to Fenway Drive at the west end of the easement. Route Alternative M2 proceeds west along Fenway Drive and Mayflower Drive approximately 1.3 miles to the intersection of Mayflower Drive and Church Street, and then follows Church Street north approximately 1,700 feet, to the intersection of Church Street and National Avenue. Route Alternative M2 follows National Avenue approximately 2,700 feet southwest to the intersection of National Avenue and Observatory Road, then follows Observatory Road approximately 2.1 miles to the west to the intersection of Observatory Road and Racine Avenue. From the intersection of Observatory Road and Racine Avenue, the route alternative heads northwest to the intersection of Racine Avenue and Sunset Drive, then west to the connection to WWU's distribution system in the vicinity of the intersection of Route 59 and Sunset Drive.

There are several areas of casing and HDD planned along Route Alternative M2, as shown in **Appendix B-5**. Casing is planned at a total of 15 roadway crossings. HDD is planned at seven waterway crossings. The remainder of Route Alternative M2 is expected to be open cut.

2.3 Route Alternative M3

Route Alternative M3 follows the same alignment as Route Alternative M2 between the intersection of 60th Street and Howard Avenue, and the intersection of Cold Spring Road and Beloit Road. From the intersection of Cold Spring Road and Beloit Road, Route Alternative M3 follows Beloit Road approximately 4.4 miles southwest to the intersection of Beloit Road and National Avenue. Route Alternative M3 then proceeds southwest approximately 3,300 feet along National Avenue, before turning to the west to intersect Racine Avenue just north of the intersection of National and Racine Avenues. From the intersection of National Avenue and Racine Avenue, the route alternative heads northwest to the intersection of Racine Avenue and Sunset Drive, where the route alternative heads west to the connection with WWU's distribution system in the vicinity of the intersection of Route 59 and Sunset Drive.

There are several areas of casing and HDD planned along Route Alternative M3, as shown in **Appendix B-5**. Casing is planned at a total of 16 roadway crossings. HDD is planned at seven waterway crossings and one roadway crossing. The remainder of Route Alternative M3 is expected to be open cut.

SECTION 3 Design Matrix Process

3.1 Criteria Considered

The criteria considered in developing this technical memorandum included the following risk factors:

- Depth to Bedrock
- Casing/HDD Areas
- Presence of Organic Soils
- Shallow Groundwater
- Dense Soils
- High Corrosivity of Soils
- Total Length of the Route Alternative

The USDA/NRCS Web Soil Survey was the primary source for estimating the length of each of the geotechnical risks along each of the alignments. The various soil series lengths were estimated along each of the route alternatives, with the various risk factors of each of the series, as estimated by the USDA/NRCS Web Soil Survey, being summed. The USDA/NRCS Web Soil Survey maps of each route alternative are included in **Appendix B-7**.

The depth to bedrock was considered a major design issue where estimated to be less than 25 feet. Shallow bedrock will create difficulty for open cut and trenchless methods of installation, and may require specialized methods such as ripping, blasting, or drilling.

The trenchless crossing area lengths were provided by others on the Program team developing the alignments. A summary of the trenchless excavation lengths is included in **Appendix B-5**. The trenchless crossing areas will result in increased costs and potentially add to the Program duration.

Where organic soils are present, it may be necessary to over-excavate these materials below the planned invert elevations, or to extend HDD/Casing below these materials to avoid settlement of the bearing soils which could result in leaking at connections or broken pipes. Other alternatives to over-excavation could include the use of flexible connections and/or installing the pipe with support from an alternative foundation system. Additionally, it may be necessary to import backfill materials where organic soils are present. Organic soils are considered unlikely to be suitable for use as Common Fill, and certainly not for use as Select Fill.

Shallow groundwater will create issues with open cut installation. Where excavations encroach upon or extend a short distance below apparent groundwater or within perched groundwater conditions, sumps and filtered sump pumps may be suitable to control the water. However, where excavations extend a foot or more below the apparent groundwater level, it may be necessary to use a series of sumps or well points along with high capacity pumps to properly control the water. It is generally recommended to lower the water to at least two feet below the bottom of the excavation. The presence of groundwater can also create difficulties with trench sidewall and bottom stability. Sloping, shoring, bracing or trench boxes may be necessary. The presence of groundwater within granular soils can be an issue for HDD/Casing installation where seizing or "lock-up" of the installation can occur if not advanced in a continuous fashion with minimal delays in the installation operation.

Dense soils may also result in longer times for excavation and require specialized excavation techniques such as ripping with a single tooth attachment to the excavator. Dense soils may also add complexity to casing installation.

High soil corrosivity may result in the need for special treatment of the pipe such as coating, linings, or cathodic protection. Polyethylene encasement is the industry standard for corrosion control of DIP and required for all installations per AWWA C105 and Section 4.4.4 of the Standard Specifications for Sewer and Water Construction in Wisconsin. It will likely be necessary to perform additional laboratory testing such as pH, resistivity, sulfate content, sulfide content, chloride content, moisture, and oxidation-reduction (redox) potential in order to evaluate the soil's corrosivity to DIP based on the Ductile Iron Pipe Research Association (DIPRA) 10-Point System and corrosivity to concrete.

Secondary risks such as the estimated LL and PI ranges are also shown on the USDA/NRCS Web Soil Survey - Series Features Table, but are not included on the Risk Decision Matrix. Higher LLs and PIs may not meet the specifications for backfill, and may result in difficulty in achieving the specified compaction.

Solution sinkholes occur where bedrock dissolves, creating pathways for overlying soils to migrate through. This creates a void below the ground surface which will collapse when it becomes large enough. No sources of information have been identified which indicate areas along the proposed alignments where sinkholes may be present. We are not aware of past history of solution sinkholes along the alignment of any of the route alternatives evaluated.

The easternmost portion of all three route alternatives is located in an area that is unmapped by the USDA/NRCS Web Soil Survey due to high amounts of urban soil disturbance. As a result, the lengths used for the risk values in the unmapped area were estimated using other sources of data, analyzing and predicting trends in the data from the mapped area, and local knowledge.

3.2 Risk Weighting Method and Risk Decision Matrix

Each of the following risk factors was given a weight ranging from 5.0 to 0.1 based on the estimated effect of each on duration, difficulty, and cost of the Program. Based on available information (including recent borings for the Program by PSI on Racine Avenue) and local knowledge of the area soils, the weights applied to apparent groundwater, perched groundwater and dense soils differ from the weight factors used on other portions of the Program. This was done to better reflect the relative impact to construction costs given the mapped locations of those features. The impact of apparent and perched groundwater was reduced, and the impact of dense soils was increased. The following weights were applied to each of the risk factors:

- Shallow Bedrock: 5.0
- Casing Trenchless Crossing Areas: 2.5
- Organic Soils: 1.0
- Apparent Groundwater: 0.6
- Perched Groundwater: 0.3
- Dense Soils: 0.6
- High Corrosivity Soils for PCCP: 0.1
- High Corrosivity Soils for Steel Pipe/DIP: 0.1

Where dense soils were estimated to be present in areas of HDD/Casing, the estimated lengths were doubled to account for the potential additional difficulty which may be encountered with trenchless methods. Where shallow apparent groundwater was present in casing areas, the estimated lengths were doubled; and where both very dense soils and shallow apparent groundwater were estimated to be present in casing areas, the estimated lengths were tripled.

Additionally, a weight of 0.05 times the total length of the route alternative was used. In that way, all things being equal, the shorter route alternative would have the higher final score.

The USDA/NRCS Web Soil Survey assigns corrosion potential separately for concrete and steel. The corrosion risk for concrete was applied to PCCP, the corrosion risk for steel was applied in the same way for both DIP and steel pipe, and no risk factor for corrosion was applied to either PVC or HDPE. The descriptions assigned to each weighting is as follows:

Concrete: "Risk of corrosion" pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens concrete. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the concrete in installations that are entirely within one kind of soil or within one soil layer.

Steel: "Risk of corrosion" pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel in installations that are entirely within one kind of soil or within one soil layer.

The risk of corrosion in each soil type is expressed as "low," "moderate," or "high." The analysis recorded the length of "high" risk soils. The factors considered in the USDA/NRCS Web Soil Survey in determining the risk to corrosion of steel pipe were fairly well aligned with the commonly used DIPRA 10-point scale for corrosion potential to DIP. The only significant difference appears to be the use of particle size distribution instead of redox potential. Therefore the classification of "high" for steel pipe was assumed to be appropriate for classification of "high" for DIP.

All of the weighted risks and weighted lengths were then totaled for each route alternative. A starting score was created using the average length (in feet) of the three route alternatives as an arbitrary starting point. The totaled risk value was then subtracted from the starting score to arrive at a final score.

The risk criteria matrices for each of the three types of pipe materials are presented in **Appendix B-9**. The matrices include each of the risk factors described in **Section 3.2**, with the estimated lengths of each factor for each route alternative. These lengths are then multiplied by the assigned weights, and the weighted risks are summed for a total risk value. The starting score is determined from the average length of the different route alternatives. The final score is determined by subtracting the total risk value from the starting score. The route alternative with the lowest risk value will therefore have the highest final score, and will be the preferred route alternative, from a geotechnical perspective.

SECTION 4 Detailed Evaluation of Risk

4.1 Depth to Bedrock

The SEWRPC data shows significant areas with depths to bedrock between 25 and 50 feet along Route Alternatives M2 and M3, as shown on the Depth to Bedrock map in **Appendix B-3**.

The Waukesha area does have shallow bedrock, mostly along an approximately six-mile wide band traversing Waukesha County in a northeast direction from the Village of Eagle to the Villages of Lannon and Menomonee Falls. This band passes through the north half of Waukesha.

Water well installation records were reviewed to evaluate depth to bedrock in private wells located within the shallow bedrock areas (25-50 feet deep) identified on the SEWRPC map. A summary of the water well records that were reviewed is presented in **Appendix B-12**. Because the recording of conditions is by many different well drillers over time, there is inconsistency in classification. Some drillers use the term "hardpan," which could indicate dense till or perhaps weathered bedrock. Accurate classification of the conditions is also not a major goal of water well installation. Therefore these well records were reviewed with some caution. Several wells near Route Alternative M3 along Beloit Road between Mars Drive and Martin Road showed depth to bedrock of less than 25 feet. The locations of these wells are shown in **Appendix B-3** and copies of the well records are included in **Appendix B-13**.

WisDOT HSI boring logs were reviewed for 11 structures along the three route alternatives. The locations of selected WisDOT structures are shown on maps in **Appendix B-1** and the boring logs for these WisDOT structures are presented in **Appendix B-11**. The HSI borings indicated bedrock at about 22 feet below grade at structure B-40-637 (Cold Spring Road over Root River) and at about 29 feet below grade at structure B-40-590 (Cold Spring Road over Wildcat Creek). Shallow bedrock was not indicated at the other WisDOT structure locations.

4.2 Organic Soils

No organic soil units were mapped on the USDA/NRCS Web Soil Survey along any of the route alternatives. It is to be expected that some organic layers may be encountered near wetlands and river crossings. A portion of Route Alternative M1 within the unmapped area is adjacent to Honey Creek and there are likely some organic soils present in this area of the route alternative.

4.3 Shallow Groundwater

The USDA/NRCS Web Soil Survey distinguishes between apparent groundwater and perched groundwater. Apparent groundwater represents a regional groundwater level which generally cannot be drained while perched groundwater is generally pockets of water trapped within granular layers or within near surface soils on top of relatively impermeable clay. The quantity and duration of flow from perched groundwater will depend on the amount of recent precipitation and size of the layer or pocket that has been saturated.

Apparent groundwater was mapped less than six feet deep in all of the potential jack and bore (casing) locations. This will likely require use of dewatering and headwall and seal assembly at each thrust and receiving pit. The use of these items prevents inflow of water and associated ground loss, and retains the annular lubricant.

Apparent groundwater was mapped as less than six feet for significant portions of all route alternatives. This issue accounted for close to one third of the assigned risk value in Route Alternatives M1 and M2 and close to one quarter of the assigned risk value for Route Alternative M3. All three route alternatives run through areas of perched and apparent groundwater until west of Calhoun Road where Route Alternative M3 travels through several areas with no shallow groundwater and a few areas with apparent shallow groundwater.

In the unmapped area scoring was estimated based on experience in the local area and general topography. Route Alternative M1 was scored as having more apparent shallow groundwater due to its proximity to Honey Creek. Route Alternatives M2 and M3 were scored with small amounts of apparent shallow groundwater as they run through more uplands with clayey soils more likely to have perched groundwater.

Perched groundwater is widely mapped along all three route alternatives, mostly corresponding to the clayey soils found on the eastern portion of Waukesha County and all of Milwaukee County.

4.4 Dense Soils

A map of dense soil types can be found in **Appendix B-9**. Relatively few dense soils are anticipated to the east of Calhoun Road. However, significant areas of dense soils may be anticipated at shallow depths west of Calhoun Road along all three route alternatives, especially along Racine Avenue. Based on the boring logs prepared by PSI and presented in **Appendix B-16**, the dense soils consist of dense sand, cobbles and boulders, and may be encountered at depths as shallow as six feet below ground surface.

The most problematic dense soils are expected to be along Racine Avenue, northwest of Swartz Road (**Appendix B-16**, Borings CC-B-111 through CC-B-117). Since this area is common to all three route alternatives, the dense soils northwest of Swartz Road have a limited impact on the decision matrices. However, these dense soils may present challenges to construction of the pipeline. Specialized equipment may be required to install the pipeline in these areas, including excavation with ripper teeth.

4.5 Corrosion Potential

The potential for soils which may display high corrosivity to DIP/steel pipe was mapped within all three route alternatives in over half the length of each route alternative. The percentage mapped as highly corrosive to steel is slightly higher in Route Alternative M2 and roughly the same in Route Alternatives M1 and M3. Relatively few areas of soil with the potential to display high corrosivity to concrete are anticipated along the route alternatives.

4.6 Overall Result

Based on differing potential for corrosion on the different pipe materials, the various pipe materials are grouped into one of three types. Steel pipe and DIP are evaluated on one table, PCCP is evaluated on another table, and PVC and HDPE are evaluated on a third table. The risk criteria matrices for each of the three types of pipe materials are presented in **Appendix B-10**. The matrices include the risk factors described in **Section 3.2**, with the estimated lengths of each factor for each route alternative. These lengths are then multiplied by the assigned weights, and the weighted risks are summed for a total risk value. The starting score is determined from the average length of the different alternatives. The final score is determined by subtracting the total risk value from the starting score.

Table B-4-1 Summary of Total Scores to Route Alternatives M1, M2 and M3

Route Alternative	Ranking	Total Score		
		Steel Pipe/ DIP	PCCP	PVC/HDPE
Route M1	Second Most Preferred	13,612	17,641	17,684
Route M2	Preferred	14,519	19,356	19,356
Route M3	Least Preferred	-13,288	-8,819	-8,819

Apparent groundwater was mapped as less than six feet for significant portions of all route alternatives. Dense soil was also present for a significant portion of all three route alternatives, along Racine Avenue. However, since these risk factors were present for all three route alternatives, they did not have much impact on the differences between the total scores.

Route Alternative M3 was the least preferred route alternative from a geotechnical perspective. Major disadvantages for Route Alternative M3 were the area of shallow bedrock identified along Beloit Road, as well as the large amount of proposed trenchless crossings. A moderate disadvantage for Route Alternative M3 was that it is the longest of the three route alternatives. In summary, Route Alternatives M1 and M2 are comparable to each other and more preferable than Route Alternative M3 from a geotechnical perspective.

SECTION 5 Recommendations for Investigation

5.1 Recommendations

Based on this technical memorandum, it is recommended that additional borings and/or deeper borings be performed in some high geotechnical risk areas. In any areas where HDD/Casing is planned, it is recommended that at least one boring be performed at each end of the obstruction to a minimum depth of about 15 feet below the lowest drill path elevation. Also, it is recommended that additional borings be performed in the area of shallow bedrock to better define the extent of shallow bedrock.

Closer spacing of borings to evaluate depth to bedrock is recommended along Route Alternative M3 from the intersection of Calhoun Road and Beloit Road to the intersection of National Avenue and Egofskes Road. Shallow bedrock is also anticipated near the intersection of Sunset Drive and Racine Avenue; this area has already been explored as part of a previous scope.

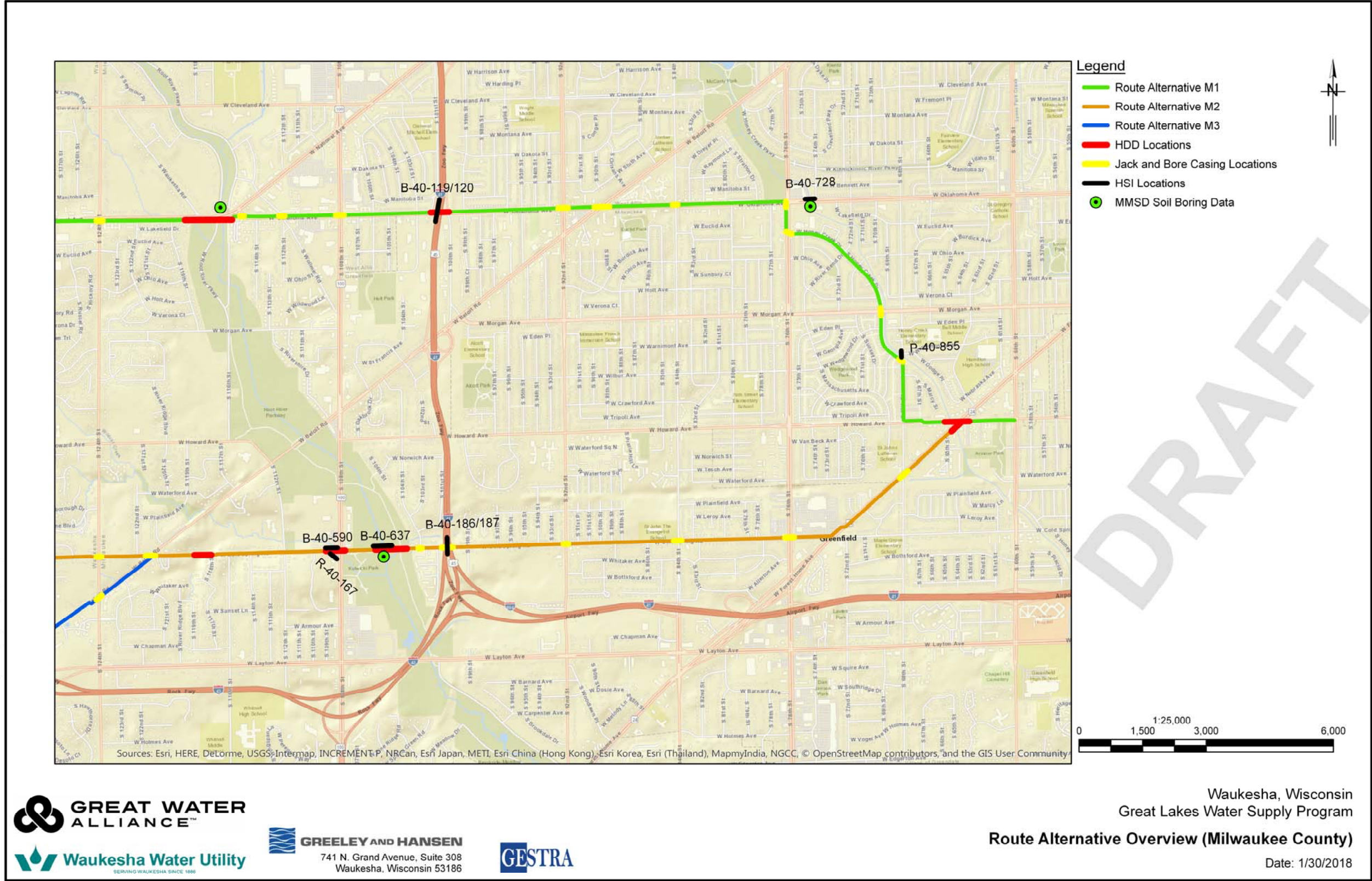
It is also recommended that further exploration using backhoe excavated test pits be considered along the selected route alternative in areas of high risk, in addition to the soil borings planned. This would include areas of dense soils, where test pits would further define the density and composition of these soils, and the effort which will be necessary to excavate to the bearing grade. Also, test pits in organic soils will help provide a better idea of the stability of trenches in these areas. Where auger refusal is encountered within borings at shallow depths, test pit excavations will identify whether the refusal materials are bedrock, cobbles, or boulders. Test pit excavations provide a better estimate of groundwater control efforts necessary and can be performed in areas where shallow groundwater is anticipated.

The average LL and PI values are shown on the USDA/NRCS Web Soil Survey - Series Features Table, but are not included on the Risk Decision Matrix. High LL and PI soils may not meet the specifications for Common Fill, and may result in difficulty in achieving the specified compaction. Once the areas of Common Fill are identified, this information can be used to evaluate the potential for excavated soil to be unsuitable for backfill. Borings taken in these soils could collect samples for natural moisture content as well as LL and PI testing. Bucket samples can also be collected to evaluate natural moisture content relative to optimum moisture for compaction.

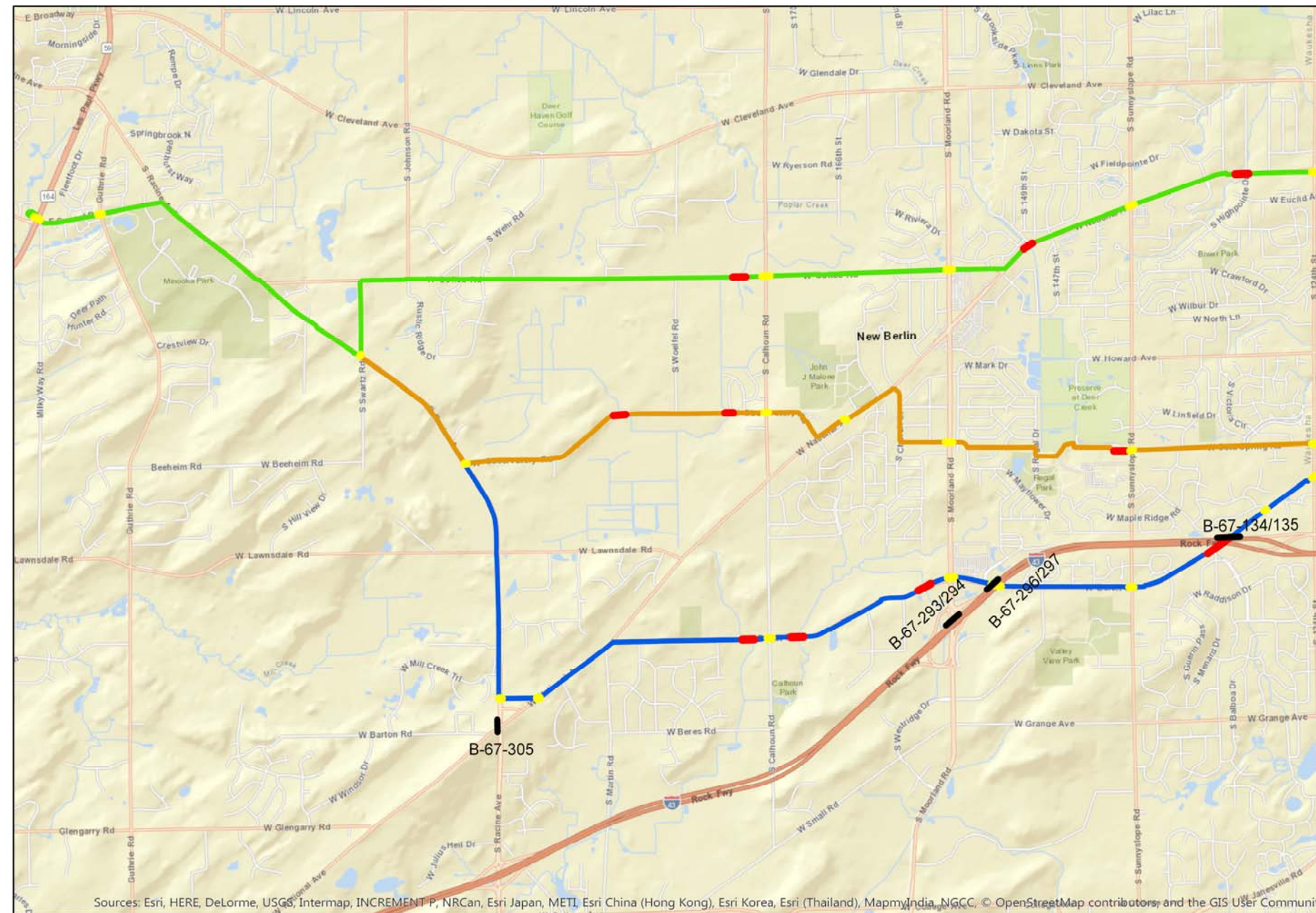


Appendix B-1 – Route Alternative Alignment Maps

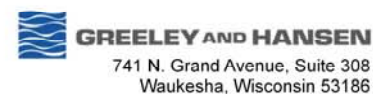




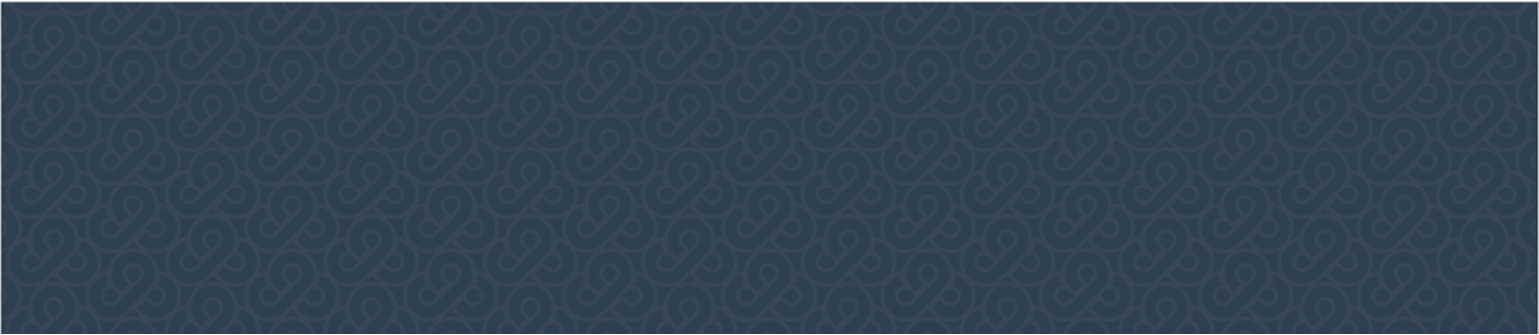
Plotted: 1/30/2018
Document Path: C:\Users\Jeff\Documents\ArcGIS\Projects\MyProject1\MyProject1.aprx



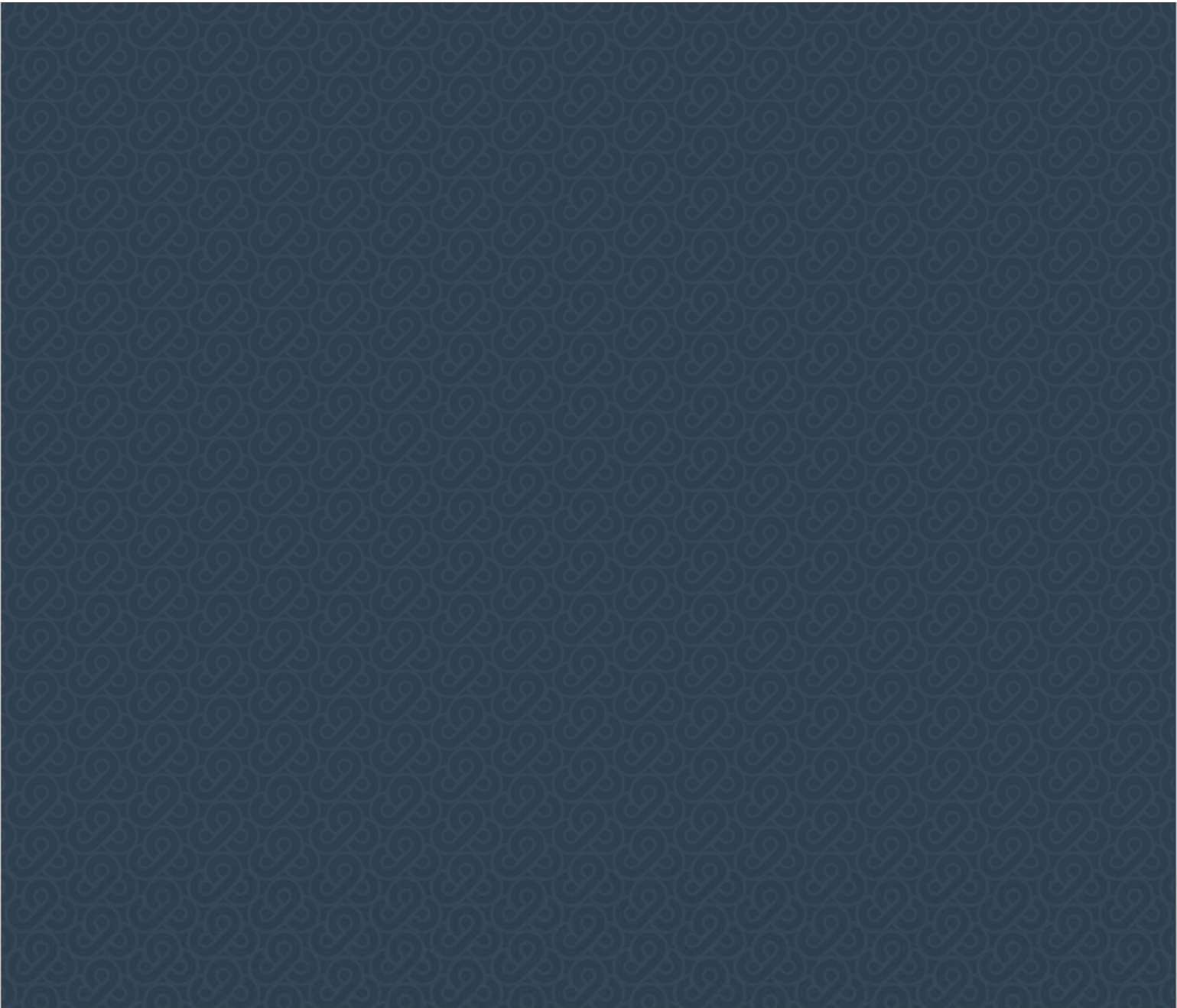
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Document Path: C:\Users\Jeff\Documents\ArcGIS\Projects\W\Project1\MyProject1.aprx



Waukesha, Wisconsin
Great Lakes Water Supply Program
Route Alternative Overview (Waukesha County)
Date: 1/30/2018



Appendix B-2 – Draft Backfill Specifications



1.1 SELECT FILL

- A. Materials for Select Fill: Use gravel, crushed stone, limestone screenings or other granular or similar material as approved which can be readily and thoroughly compacted to 95 percent of the maximum dry density obtainable by ASTM D 1557.

1. Grade select fill between the following limits:

U.S. Standard Sieve	Percent Passing by Weight
2 inch	100
1-1/2 inch	90-100
1 inch	75-95
1/2 inch	45-70
#4	25-50
#10	15-40
#200	5-15

2. Very fine sand, uniformly graded sands and gravels, or other materials that have a tendency to flow under pressure when wet are unacceptable as select fill.

1.2 COMMON FILL

- A. Materials for Common Fill: Material from on-site excavation may be used as common fill provided that it can be readily compacted to 90 percent of the maximum dry density obtainable by ASTM D 1557, and does not contain unsuitable material. Select fill may be used as common fill at no change in the Contract Price.

- B. Granular Materials On-Site: Granular on-site material, which is fairly well graded between the following limits may be used as granular common fill:

U.S. Standard Sieve	Percent Passing by Weight
3 inch	100
#10	50-100
#60	20-90
#200	0-20

- C. Cohesive Materials On-Site: Cohesive site material may be used as common fill.

1. The gradation requirements do not apply to cohesive common fill.

2. Use material having a liquid limit less than or equal to 40 and a plasticity index less than or equal to 20.

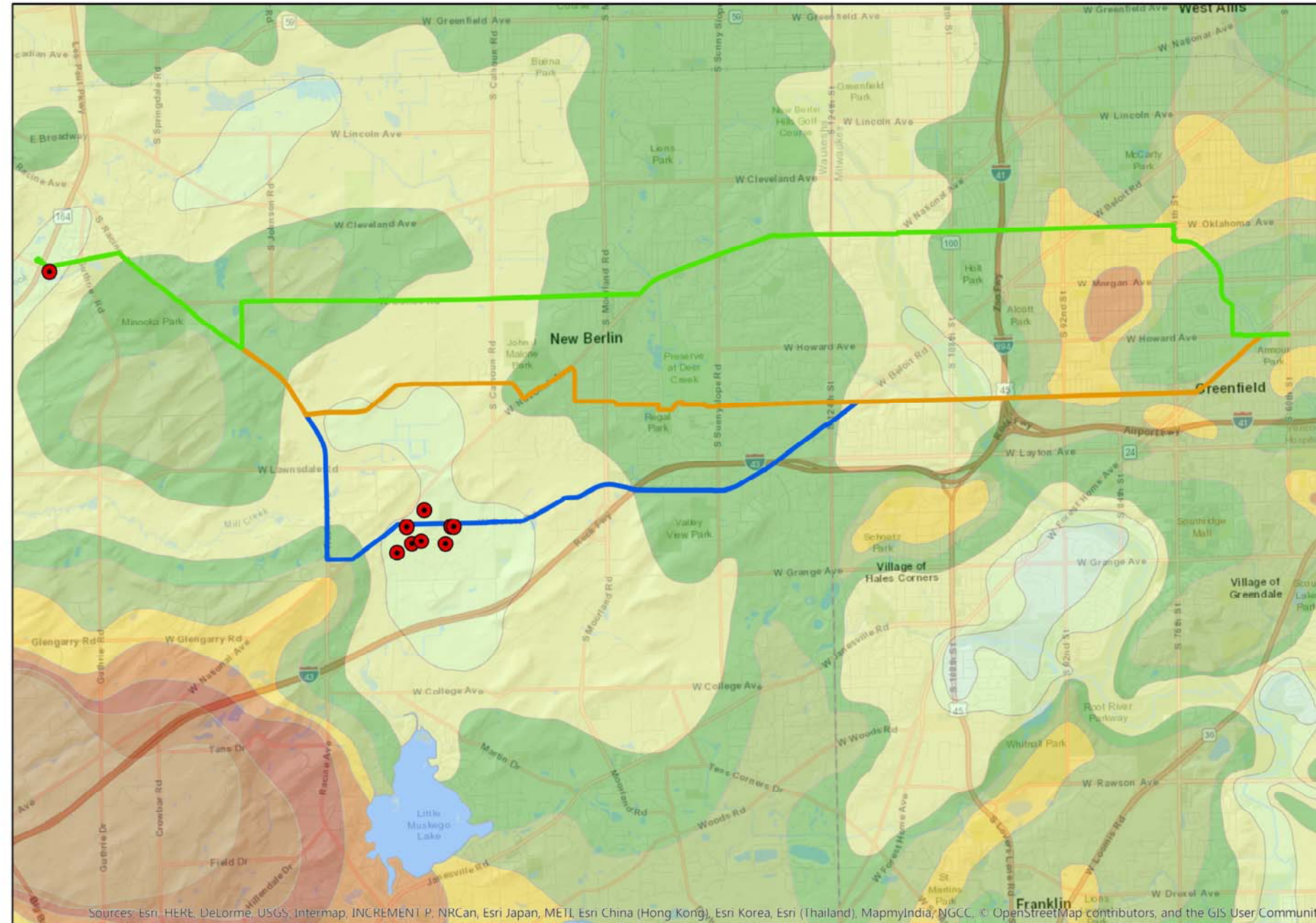
- D. Material Approval: All material used as common fill is subject to approval. If there is insufficient on-site material, import whatever additional off-site material is required which conforms to the specifications and at no additional cost.

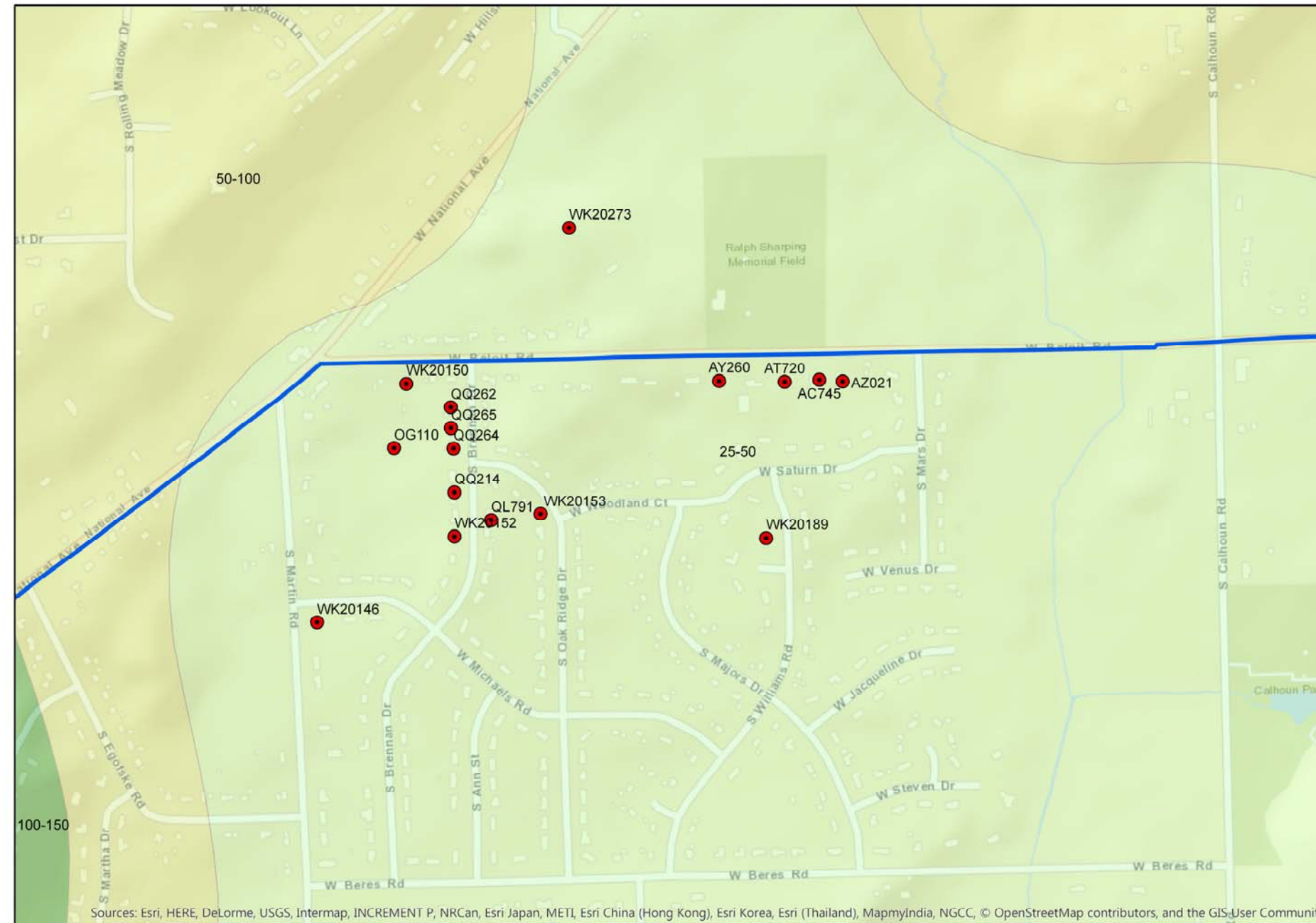
1.3 PIPE BEDDING

- A. Gradation for Small Piping: For pipe 18 inches or less in diameter, comprise pipe bedding of material 90 percent of which will be retained on a No. 8 sieve and 100 percent of which will pass a 1/2-inch sieve and be well graded between those limits.
- B. Gradation for Large Piping: For pipe larger than 18 inches in diameter, use the same pipe bedding material as specified for smaller pipe or use a similar well graded material 90 percent of which will be retained on a No. 8 sieve and 100 percent of which will pass a 1-inch sieve.

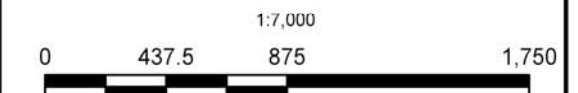
DRAFT

Appendix B-3 – SEWRPC Depth to Bedrock Map





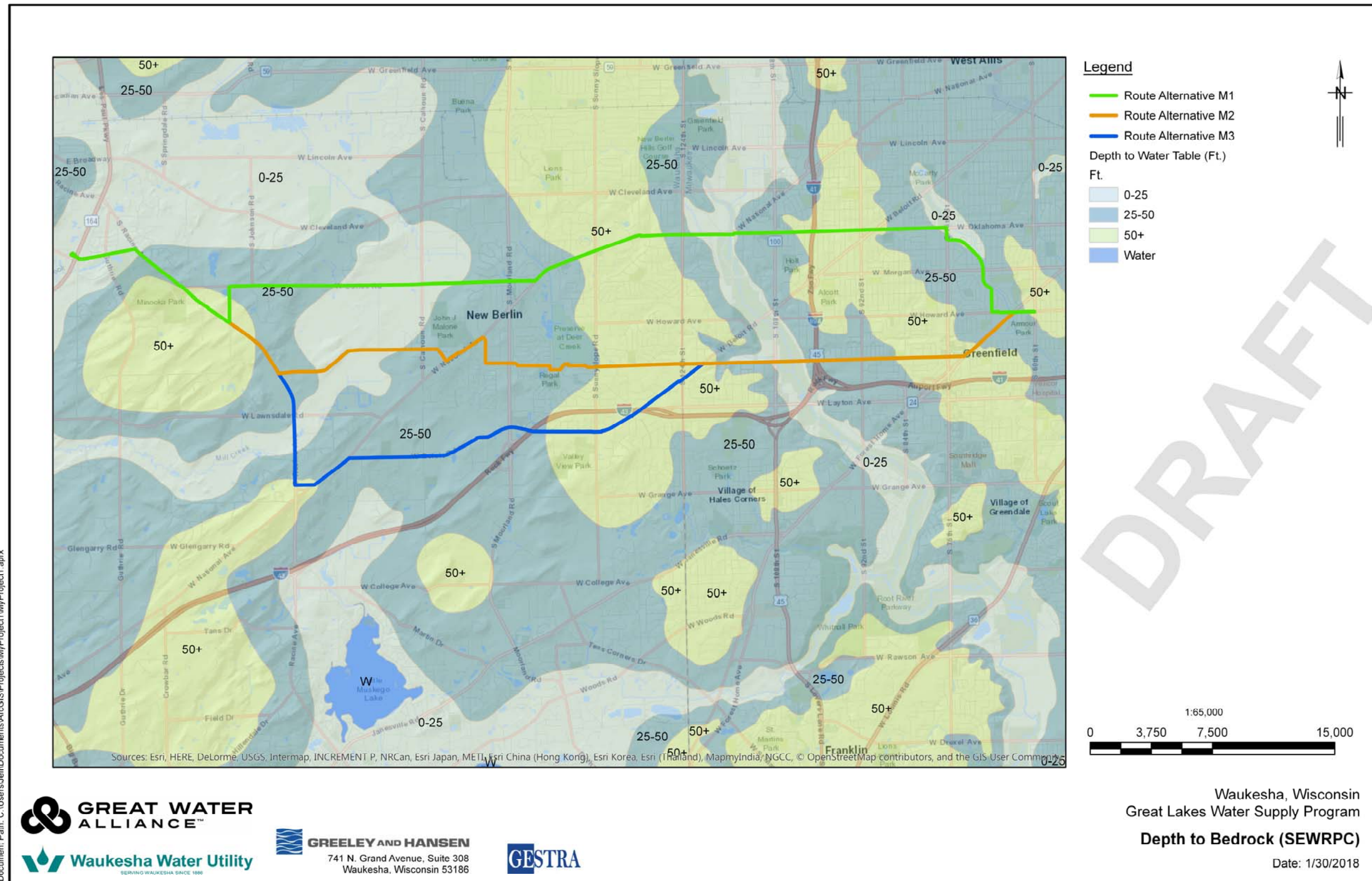
- Legend**
- WI DNR Water Well Log
 - Route Alternative M3
- Depth to Bedrock
Ft.
- 25-50
 - 50-100
 - 100-150





Appendix B-4 – SEWRPC Depth to Water Table Map







Appendix B-5 – Trenchless Excavation Areas



APPENDIX B-5 – TRENCHLESS EXCAVATION AREAS

Trenchless Excavation Areas

Obstacle	Casing/ HDD?	Existing Borings?	Dense Soils ^A	Groundwater Condition ^A	Estimated Total Casing/ HDD Length (ft) ^B	Contract 2 Route Alternative(s)
Intersection of 68th Street and Honey Creek Drive	Casing	No	-	-	107	M1
Intersection of Honey Creek Drive and Morgan Ave	Casing	No	-	-	169	M1
Intersection of 76th Street and Honey Creek Drive	Casing	No	Yes	Perched	137	M1
Intersection of 76th Street and Oklahoma Avenue	Casing	HSI ^C , MMSD ^D	No	Apparent	127	M1
Intersection of 84th Street and Oklahoma Avenue	Casing	No	Yes	Perched	110	M1
Intersection of Beloit Road and Oklahoma Avenue	Casing	No	Yes	Both	350	M1
Intersection of 92nd Street and Oklahoma Avenue	Casing	No	No	Apparent	229	M1
Intersection of 108th Street and Oklahoma Avenue	Casing	No	No	Apparent	189	M1
Intersection of Wollmer Avenue and Oklahoma Avenue	Casing	No	Yes	Both	133	M1
Intersection of National and Oklahoma Avenues	Casing	No	No	Apparent	94	M1
Intersection of 124th Street and Oklahoma Avenue	Casing	No	Yes	Perched	146	M1
Intersection of Sunnyslope Road and National Avenue	Casing	No	Yes	Perched	165	M1
Intersection of Moorland Road and Coffee Road	Casing	No	Yes	Perched	175	M1
Intersection of Calhoun Road and Coffee Road	Casing	No	No	Apparent	223	M1
Intersection of Swartz Road and Racine Avenue	Casing	PSI ^F	Yes	Perched	67	M1
Intersection of Sunset Drive and Guthrie Road	Casing	PSI ^F	Yes	None	115	M1, M2, M3
Intersection of Sunset Drive and Les Paul Pkwy	Casing	No	No	Apparent	196	M1, M2, M3
Intersection of 68th Street and Forest Home Ave	Casing	No	-	-	239	M2, M3
Intersection of 76th Street and Cold Spring Road	Casing	No	Yes	Perched	215	M2, M3
Intersection of 84th Street and Cold Spring Road	Casing	No	Yes	Perched	183	M2, M3
Intersection of 92nd Street and Cold Spring Road	Casing	No	No	Apparent	112	M2, M3
Intersection of IH-41/894 and Cold Spring Road	Casing	HSI ^C	Yes	Both	264	M2, M3
Intersection of 104th Street and Cold Spring Road	Casing	No	Yes	Both	82	M2, M3
Intersection of Beloit Road and Cold Spring Road	Casing	No	Yes	Perched	227	M2
Intersection of 124th Street and Cold Spring Road	Casing	No	Yes	Both	117	M2
Intersection of Sunnyslope Road and Cold Spring Road	Casing	No	No	Apparent	93	M2
Intersection of Moorland Road and Mayflower Drive	Casing	No	No	Apparent	200	M2
Crossing of National Ave just North East of Observatory Road	Casing	No	Yes	Perched	89	M2
Intersection of Calhoun Road and Observatory Road	Casing	No	Yes	Perched	114	M2
Intersection of Racine Avenue and Observatory Road	Casing	PSI ^F	No	Apparent	69	M2
Intersection of 124th Street and Beloit Road	Casing	No	No	Apparent	156	M3
Intersection of Armour Avenue and Beloit Road	Casing	No	Yes	Perched	87	M3
Intersection of Sunnyslope Road and Beloit Road	Casing	No	No	Apparent	132	M3
Intersection of IH-43 and Beloit Road	Casing	HSI ^C	Yes	Both	290	M3
Intersection of Moorland Road and Beloit Road	Casing	No	No	Apparent	199	M3
Intersection of Calhoun Road and Beloit Road	Casing	WDNR ^E	Yes	Perched	134	M3
North East of intersection of Racine and National Avenues	Casing	HSI ^C	Yes	None	88	M3
To Cross National Avenue East of Racine Avenue	Casing	HSI ^C	Yes	None	92	M3

^A per USDA/NRCS web soil survey

^B Values provided by Greeley and Hansen

^C Soil Boring information obtained from WisDOT HSI, as shown in **Appendix B-11**

^D Soil boring information obtained from MMSD database, as shown in **Appendix B-14**

^E Well construction information obtained from WDNR water well database, as shown in **Appendices B-12 and B-13**

^F Soil borings performed by PSI along Racine Avenue, as shown in **Appendix B-16**

Trenchless Excavation Areas

Obstacle	Casing/ HDD?	Existing Borings?	Dense Soils ^A	Groundwater Condition ^A	Estimated Total Casing/ HDD Length (ft) ^B	Contract 2 Route Alternative(s)
Intersection of Forest Home and Howard Avenues	HDD	No	-	-	591	M1
Intersection of I41/894 and Oklahoma Avenue	HDD	HSI ^C	No	Apparent	440	M1
Oklahoma Avenue crossing of Root River	HDD	MMSD ^D	No	Apparent	1120	M1
National Avenue at 130th Street and Unnamed Creek	HDD	No	Yes	Perched	389	M1
National Avenue crossing of Deer Creek	HDD	No	No	Apparent	300	M1
Coffee Road crossing of Poplar Creek	HDD	No	No	Apparent	374	M1
Forest Home crossing Honey Creek	HDD	No	-	-	290	M2, M3
Cold Spring Road crossing of Root River	HDD	HSI ^C , MMSD ^D	No	Apparent	753	M2, M3
Cold Spring Road crossing of Wildcat Creek and S 108th Street	HDD	HSI	Yes	Both	461	M2, M3
Cold Spring Road crossing of Tributary to Wildcat Creek	HDD	No	Yes	Both	407	M2, M3
West of Intersection of Sunnyslope Road and Cold Spring Road	HDD	No	No	Apparent	357	M2
Observatory Road between Elm Drive and Woelfel Road crossing Poplar Creek	HDD	No	No	Apparent	233	M2
Observatory Road between Woelfel Road and Woodsvie Court	HDD	No	No	Apparent	358	M2
Intersection of IH-43 and Beloit Road	HDD	HSI ^C	No	Apparent	792	M3
Beloit Road crossing of Unnamed Creek (West of Moorland Road)	HDD	WDNR ^E	Yes	Both	411	M3
Beloit Road crossing of Unnamed Creek (East of Calhoun Road)	HDD	HSI ^C , WDNR ^E	Yes	Both	374	M3
Beloit Road crossing of Unnamed Creek (West of Calhoun Road)	HDD	WDNR ^E	No	Apparent	352	M3

^A per USDA/NRCS web soil survey

^B Values provided by Greeley and Hansen

^C Soil Boring information obtained from WisDOT HSI, as shown in **Appendix B-11**

^D Soil boring information obtained from MMSD database, as shown on **Appendix B-14**

^E Well construction information obtained from WDNR water well database, as shown in **Appendices B-12 and B-13**

^F Soil borings performed by PSI along Racine Avenue, as shown in **Appendix B-16**



Appendix B-6 – USDA/NRCS Soil Series Features



APPENDIX B-6 – USDA/NRCS SOIL SERIES FEATURES

USDA/NRCS Soil Survey - Series Features

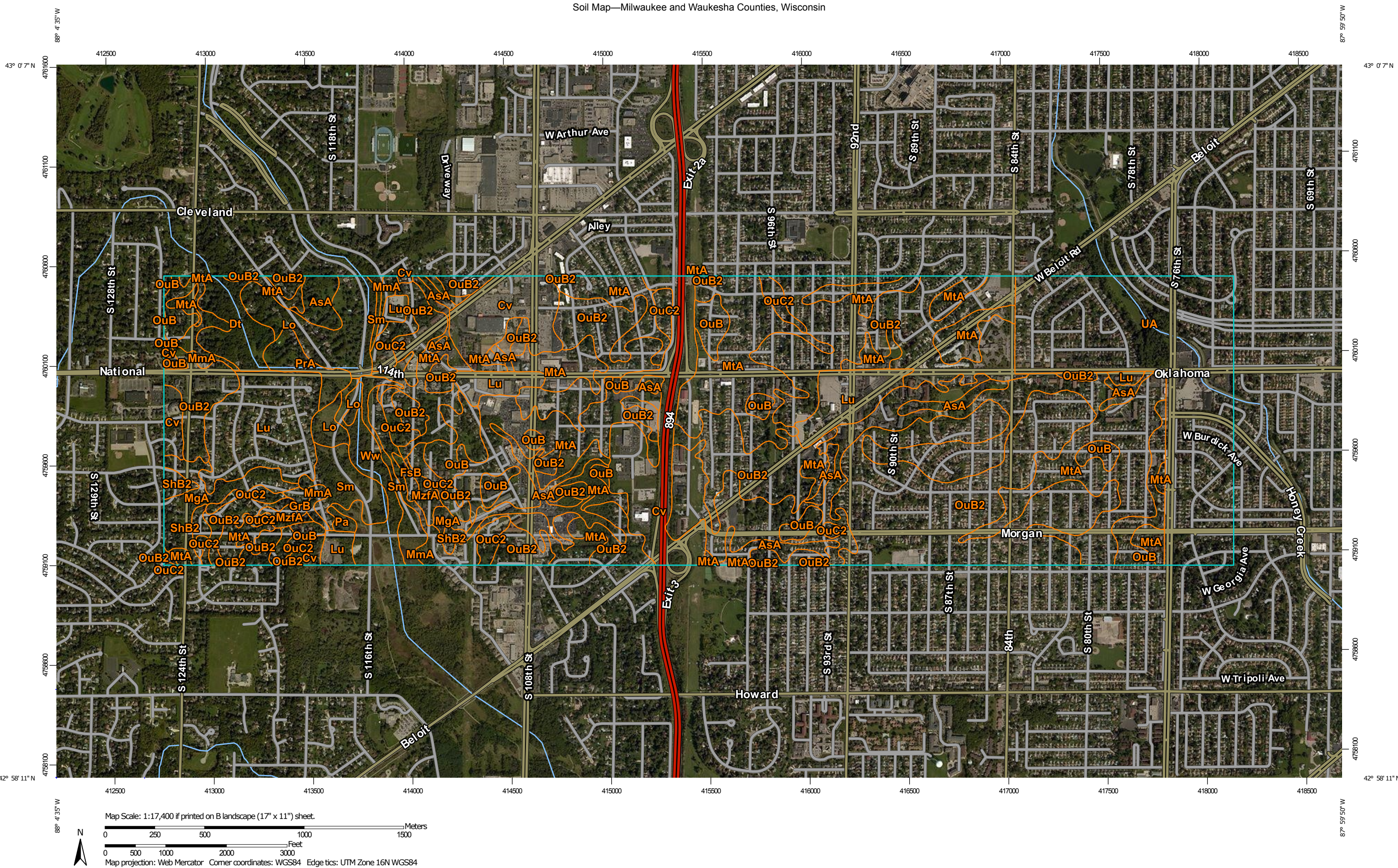
Map Symbol	Soil Series Name	USCS Classification (Surface)	Approximate Depth to Bedrock (in.)	Water Table		Depth of Organic Soils (in.)	Dense Layers?	Risk of Corrosion		Liquid Limit	Plasticity Index
				Approximate Depth (ft.)	Type of Water Table			Uncoated Steel	Concrete		
AsA	Ashkum	MH	>60	0.5	Apparent	-	No	High	Low	49	25
AzB	Aztalan	ML	>60	0.6	Perched	-	No	High	Low	41	20
BIA	Blount	CL	>60	0.9	Perched	-	No	High	Moderate	41	20
BnB	Boyer	SC-SM	>60	-	-	-	No	High	Moderate	13	6
BsA	Brookston	CL	>60	0.7	Apparent	-	No	High	Low	34	14
CeB	Casco	CL	>60	-	-	-	No	High	Moderate	10	4
Cv	Clayey land		>60	3.5	Apparent	-	No				
Cw	Colwood	ML	>60	0.0	Apparent	-	No	Moderate	Low	32	12
DdB	Dodge	CL	>60	-	-	-	No	Low	Moderate	34	16
Dt	Drummer		>60	0.0	Apparent	-	Yes	High	Low	37	15
EsA	Elliott	CL	>60	1.1	Perched	-	No	High	Low	37	17
FoB	Fox	CL	>60	-	-	-	No	High	Moderate	19	8
FsB	Fox	CL	>60	-	-	-	No	High	Moderate	18	8
FsC2	Fox	CL	>60	-	-	-	No	High	Moderate	18	9
GP	Gravel pit		>60	-	-	-	No				
GrB	Grays	CL	>60	-	-	-	No	High	Low	31	14
HeB	Hebron	CL-ML	>60	-	-	-	No	Moderate	Low	36	17
HmB	Hochheim	CL	>60	-	-	-	Yes	Low	Low	28	13
HmB2	Hochheim	CL	>60	-	-	-	No	Low	Low	20	8
HmC2	Hochheim	CL	>60	-	-	-	No	Low	Low	25	11
HmD2	Hochheim	CL	>60	-	-	-	Yes	Low	Low	25	8
HmE2	Hochheim	CL	>60	-	-	-	Yes	Low	Low	25	8
HoC3	Hochheim	CL	>60	-	-	-	No	Low	Low	27	9
HoD3	Hochheim	CL	>60	-	-	-	No	Low	Low	27	9
HoE3	Hochheim	CL	>60	-	-	-	No	Low	Low	27	9
HtA	Houghton	PT	>60	0.0	Apparent	0	No	High	High		
HtB	Houghton	PT	>60	0.0	Apparent	0	No	High	Moderate		
KIA	Kendall	CL	>60	2.0	Apparent	-	No	High	Moderate	29	11
LmB	Lamartine	ML	>60	1.6	Apparent	-	No	High	Low	31	12
Lo	Lawson	CL	>60	2.0	Apparent	-	No	High	Low	27	10
Lu	Loamy land		>60	3.5	Apparent		No				
MeB	Markham	CL	>60	2.2	Perched	-	Yes	High	Low	40	19
Mf	Marsh		>60	0.0	Apparent	-	Yes				
MgA	Martinton	CL	>60	2.0	Apparent	-	No	High	Low	39	20
MmA	Matherton		>60	1.5	Apparent	-	No	High	Low	34	8
MoB	Mayville	CL	>60	2.1	Apparent	-	No	High	Moderate	32	14
MtA	Mequon	CL-ML	>60	2.0	Apparent	-	No	High	Low	40	18
Mzb	Montgomery	CL	>60	0.0	Apparent	-	No	High	Low	50	29
MzfA	Mundelein	ML	>60	1.6	Apparent	-	No	High	Low	35	14
Na	Navan	CL	>60	0.0	Apparent	-	No	High	Low	42	20
Oc	Ogden	PT	>60	0.0	Apparent	0	No	High	Low	55	33
OuB	Ozaukee	CL	>60	2.4	Perched	-	No	High	Low	30	14
OuB2	Ozaukee	CL	>60	2.4	Perched	-	No	High	Low	30	14
OuC2	Ozaukee	CL	>60	2.4	Perched	-	No	High	Low	30	14
OuD2	Ozaukee	CL	>60	2.5	Perched	-	No	High	Low	31	15
OzaB	Ozaukee	CL	>60	2.3	Perched	-	No	High	Moderate	33	16
OzaB2	Ozaukee	CL	>60	2.4	Perched	-	No	High	Low	32	16
OzaC2	Ozaukee	CL	>60	2.6	Perched	-	No	High	Low	32	15
OzaD2	Ozaukee	CL	>60	2.6	Perched	-	No	High	Low	32	15
Pa	Palms	PT	>60	0.0	Apparent	0	No	High	Moderate	43	21
Ph	Pella	ML	>60	0.0	Apparent	-	No	Moderate	Low	38	18
PrA	Pistakee	CL	>60	2.0	Apparent	-	No	High	Low	29	10
Ru	Edwards	PT	>60	0.0	Apparent	0	No	High	Low	0	0
ScB	St. Charles	CL	>60	4.0	Apparent	-	No	Low	Moderate	33	14
ShB	Saylesville	CL	>60	-	-	-	No	Moderate	Low	42	22
ShB2	Saylesville	CL	>60	-	-	-	No	Moderate	Low	42	22
ShC2	Saylesville	CL	>60	-	-	-	No	Moderate	Low	42	22
Sm	Sebewa	CL	>60	0.5	Apparent	-	No	High	Low	16	7
ThB	Theresa	CL	>60	-	-	-	Yes	Low	Low	30	12
ThB2	Theresa	CL	>60	-	-	-	Yes	Low	Low	27	13
ThC2	Theresa	CL	>60	-	-	-	Yes	Low	Low	29	14
UA	Unmapped area		>60	-	-	-	No				
VsA	Virgil	CL	>60	1.0	Apparent	-	No	High	Low	32	15
W	Water		>60	-	-	-	No				
Wa	Walkill		>60	0.0	Apparent	-	No	High	Low	45	10
Ww	Wet alluvial land		>60	0.0	Apparent	-	No			36	14



Appendix B-7 – USDA/NRCS Detailed Soil Maps



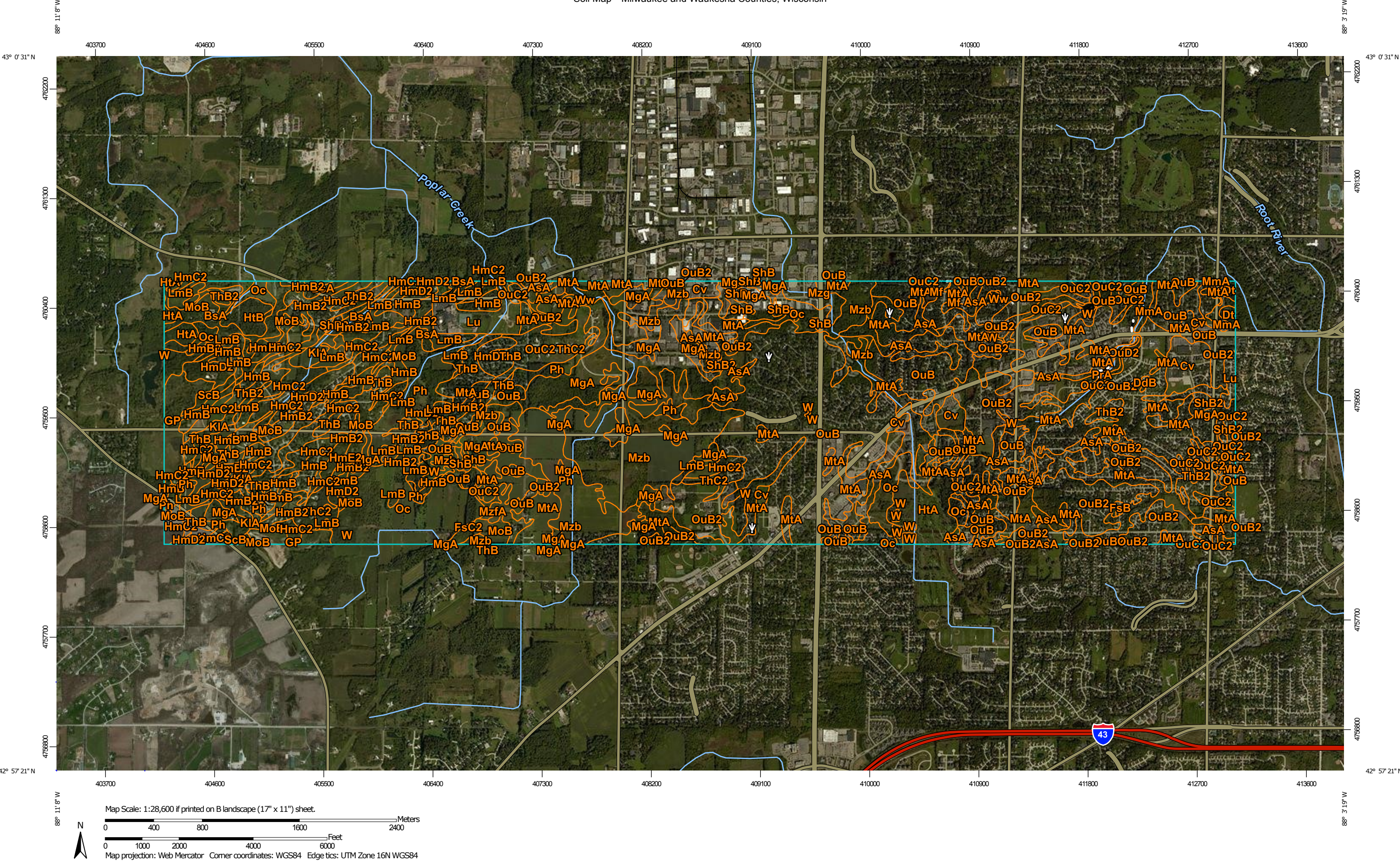
Soil Map—Milwaukee and Waukesha Counties, Wisconsin



Natural Resources
Conservation Service

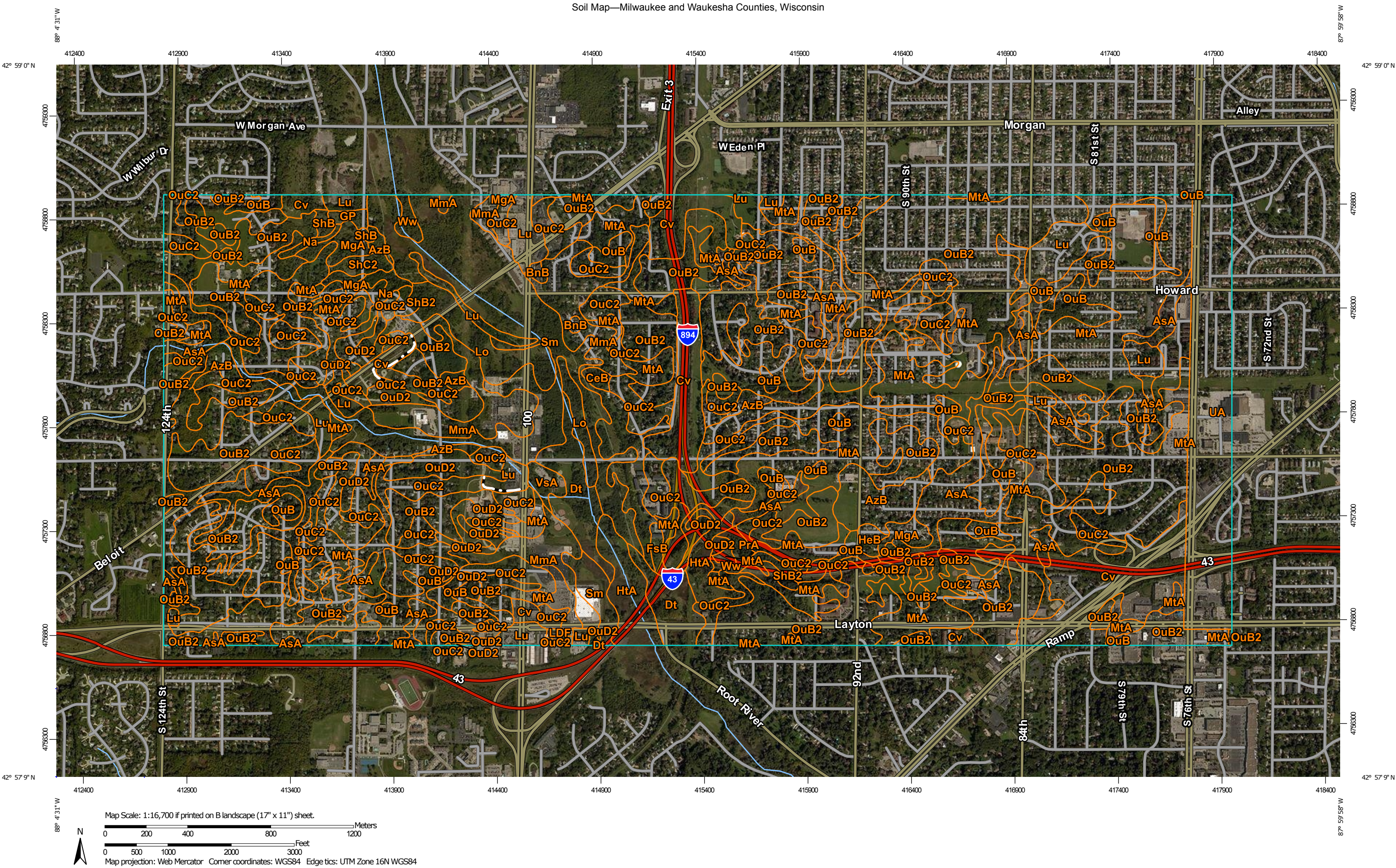
Web Soil Survey
National Cooperative Soil Survey

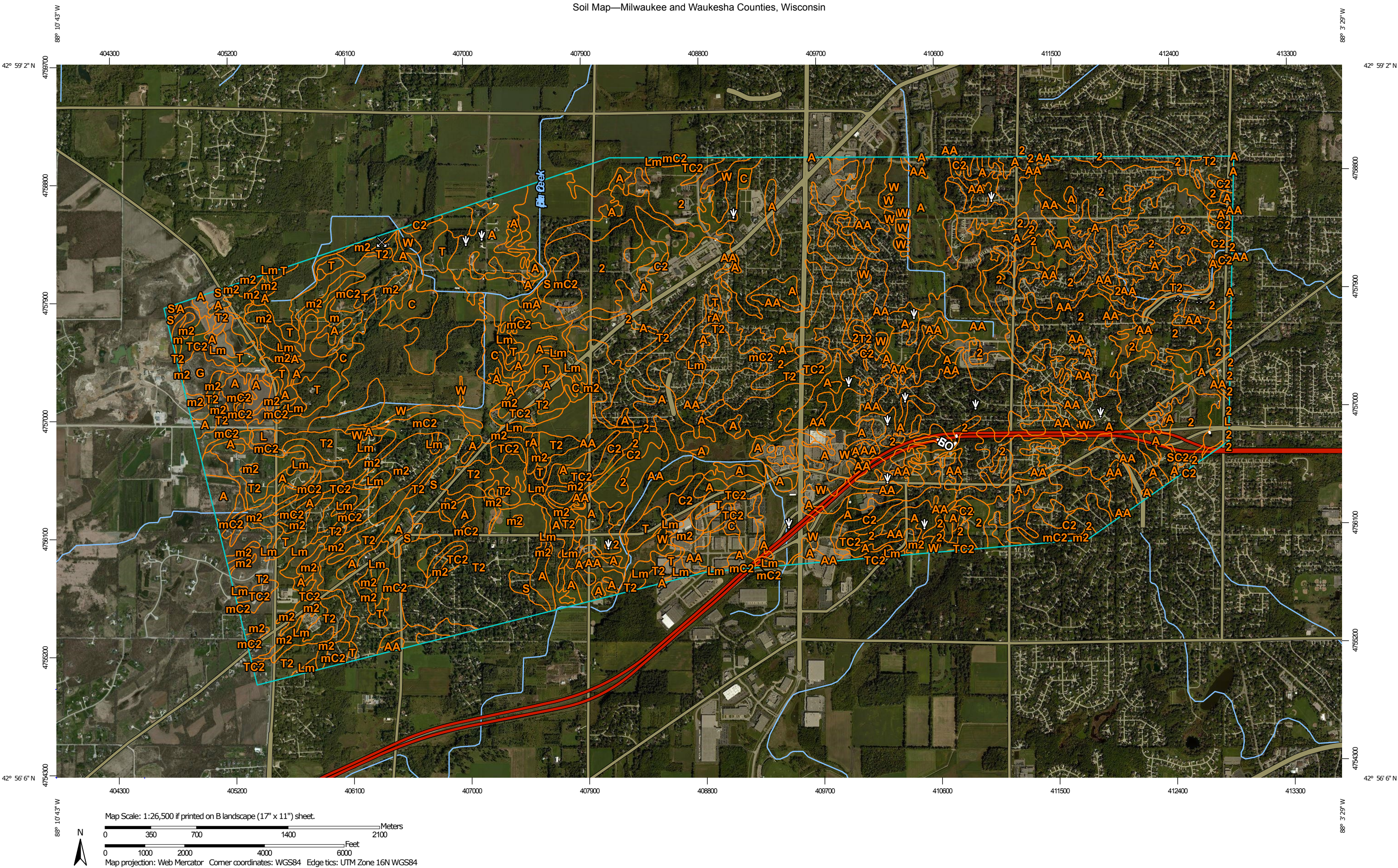
Soil Map—Milwaukee and Waukesha Counties, Wisconsin



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey





Map Scale: 1:26,500 if printed on B landscape (17" x 11") sheet.

0 350 700 1400 2100 Meters

0 1000 2000 4000 6000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey




1/4/2018
Page 1 of 4

Appendix B-8 – USDA/NRCS Map


Legend


MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Milwaukee and Waukesha Counties, Wisconsin

Survey Area Data: Version 13, Oct 6, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

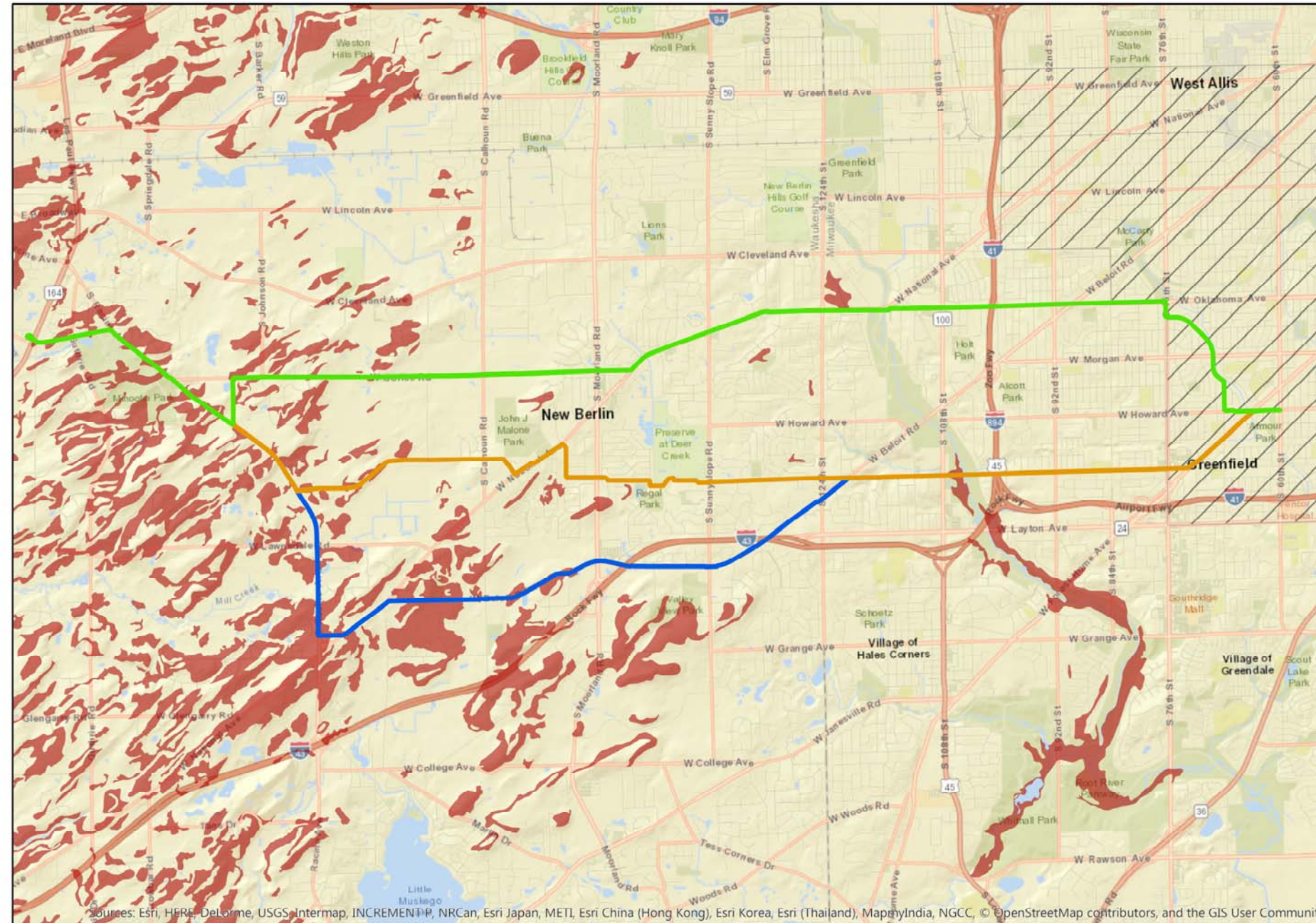
Date(s) aerial images were photographed: Sep 7, 2014—Sep 22, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

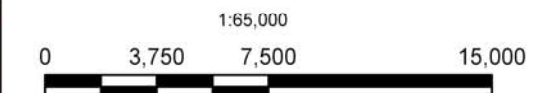


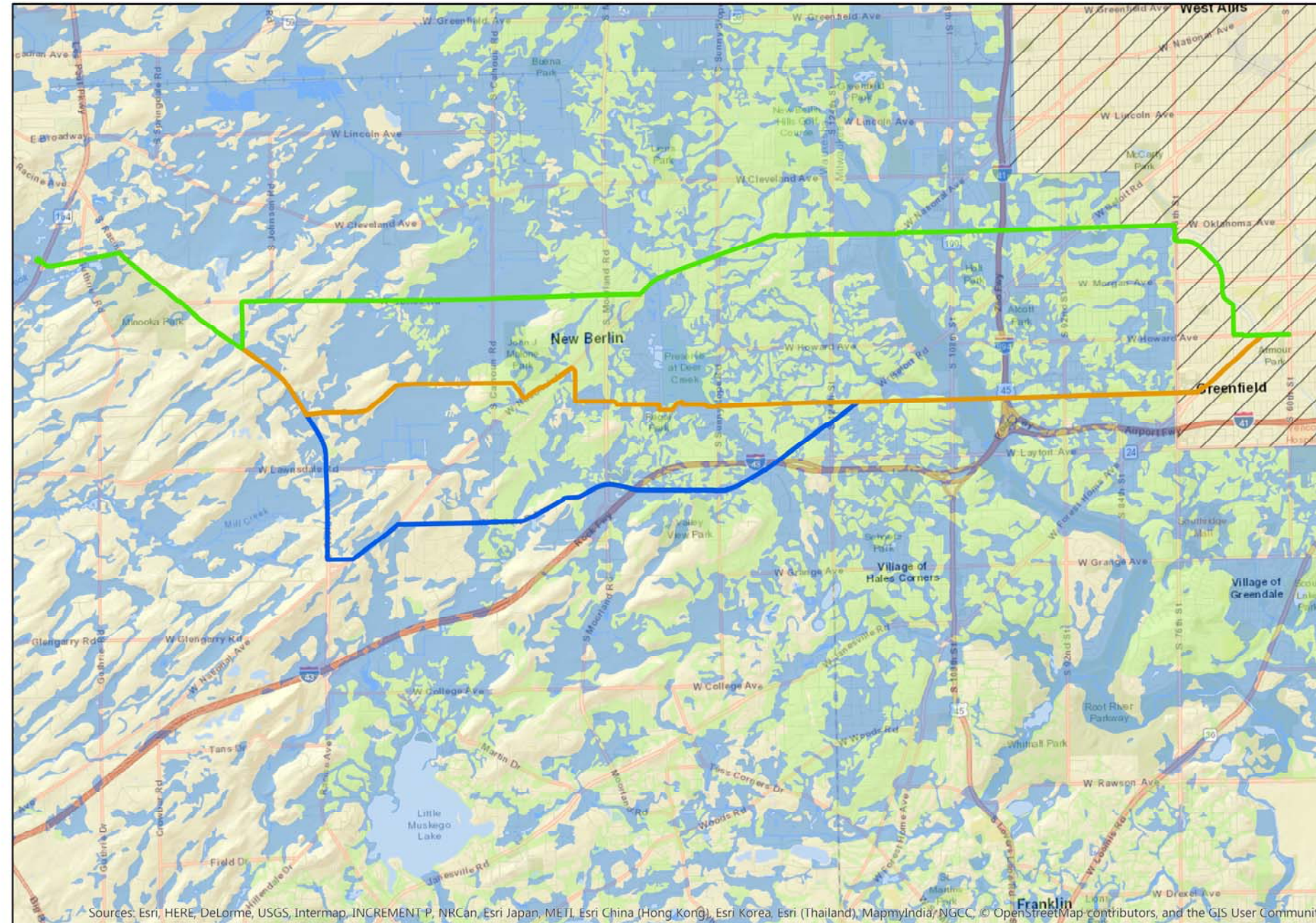
Appendix B-9 – Route Alternative Risk Area Overviews



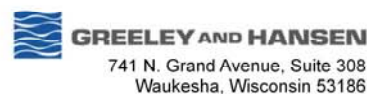
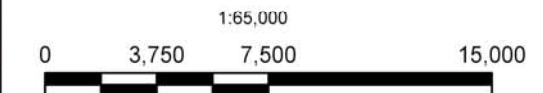


- Legend**
- Route Alternative M1
 - Route Alternative M2
 - Route Alternative M3
 - Dense Soils
 - USDA/NRCS Unmapped Area



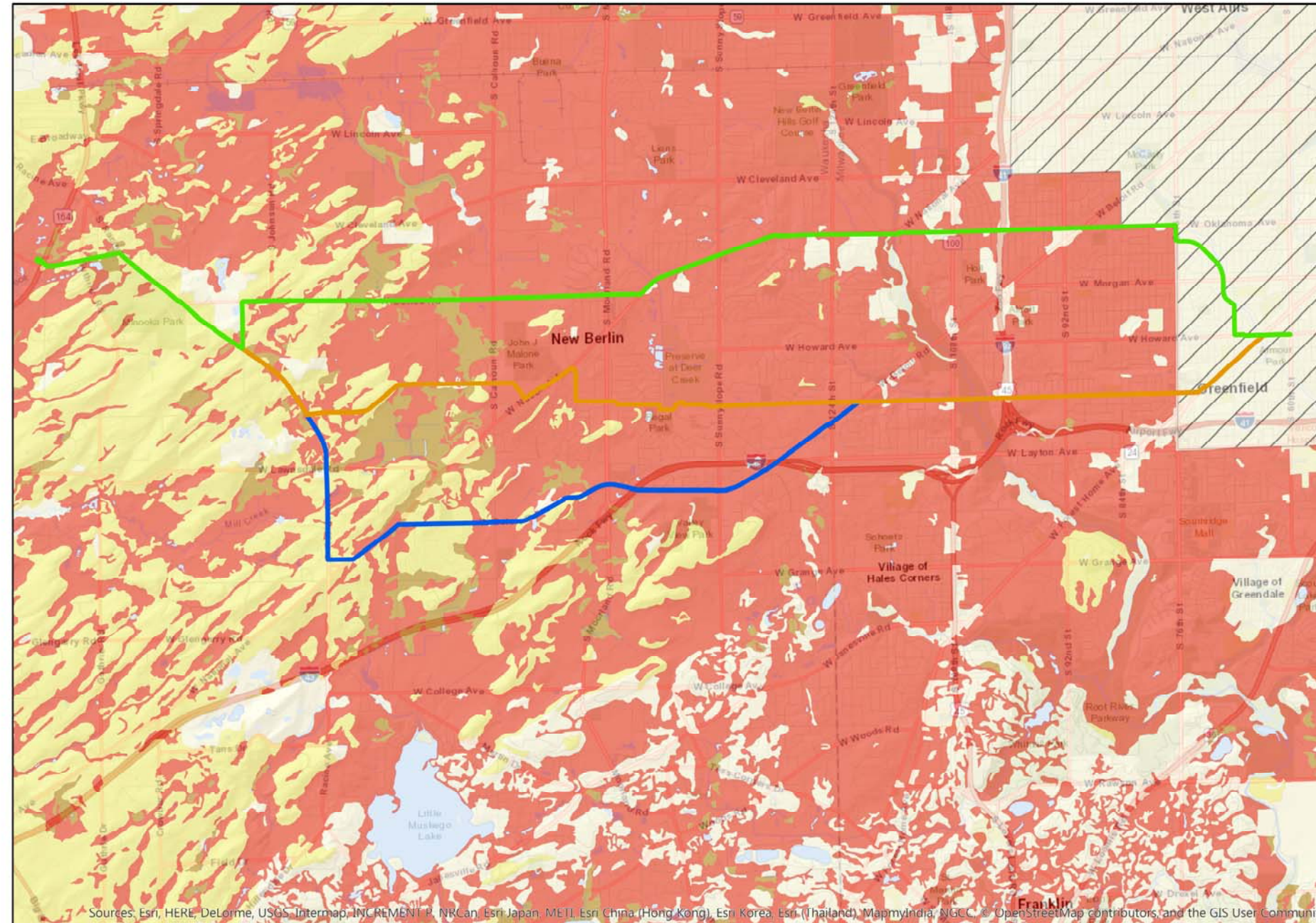


- Legend**
- Route Alternative M1
 - Route Alternative M2
 - Route Alternative M3
 - USDA/NRCS Unmapped Area
 - Shallow Groundwater less than 6'
 - Apparent
 - Perched
 - No Shallow Groundwater or No Data

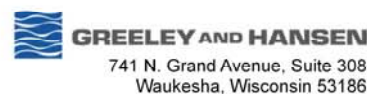
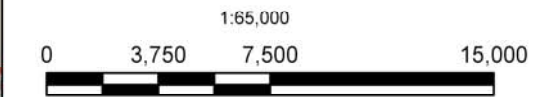


Waukesha, Wisconsin
Great Lakes Water Supply Program
Shallow Groundwater
Date: 1/30/2018

Plotted: 1/30/2018
Document Path: C:\Users\Jeff\Documents\ArcGIS\Projects\MyProject1\MyProject1.aprx

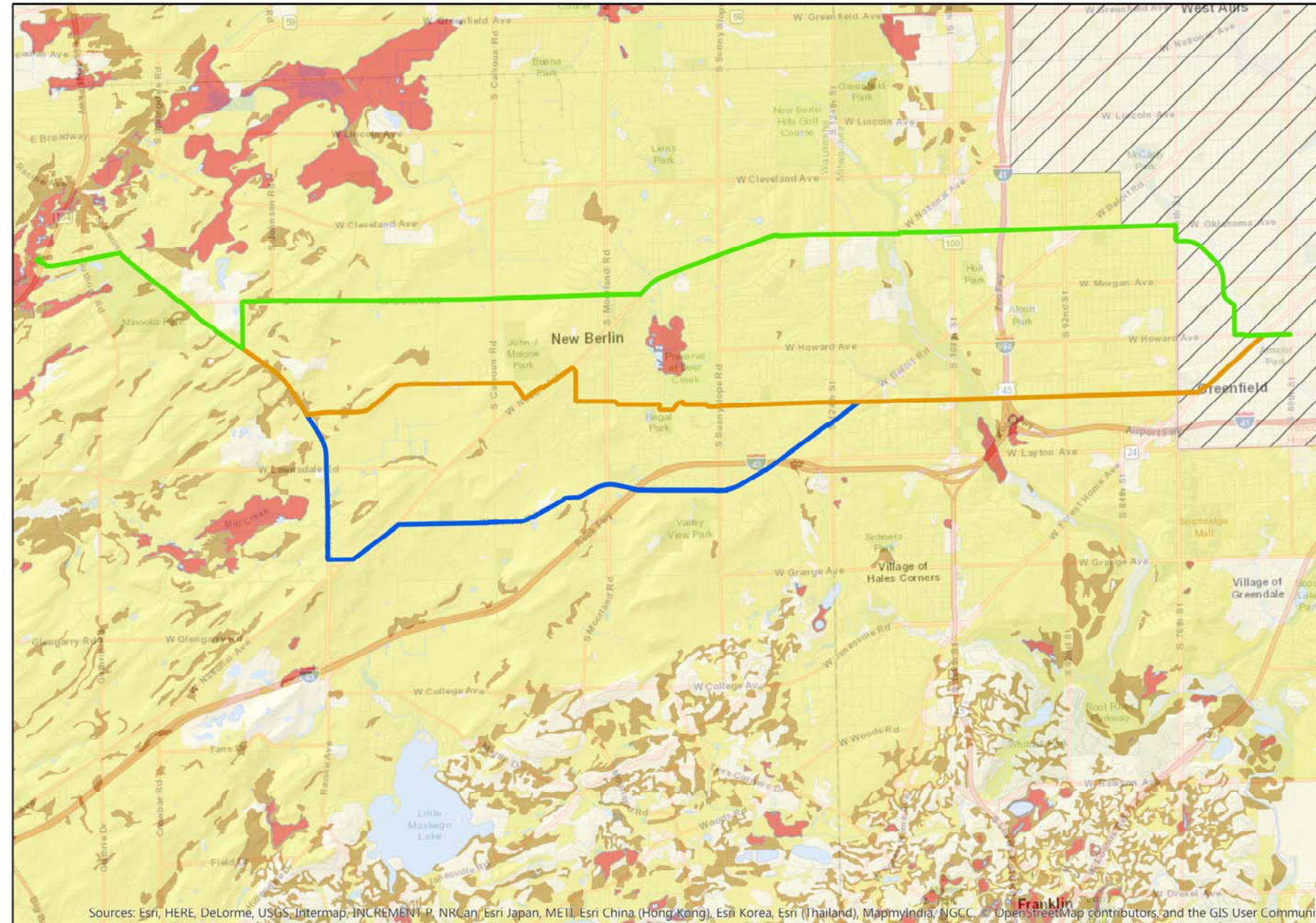


- Legend**
- Route Alternative M1
 - Route Alternative M2
 - Route Alternative M3
 - USDA/NRCS Unmapped Area
- Corrosivity to Steel**
- High
 - Moderate
 - Low
 - No Data

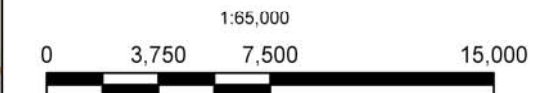


Waukesha, Wisconsin
Great Lakes Water Supply Program
Corrosivity to Steel
Date: 1/30/2018

Plotted: 1/30/2018
Document Path: C:\Users\Jeff\Documents\ArcGIS\Projects\MyProject1\MyProject1.aprx



- Legend**
- Route Alternative M1
 - Route Alternative M2
 - Route Alternative M3
 - USDA/NRCS Unmapped Area
 - Corrosivity to Concrete
 - High
 - Moderate
 - Low
 - No Data





Appendix B-10 – Route Alternative Decision Matrices



Great Lakes Water Supply Route Alternative Risk Decision Matrix – Milwaukee Supply

DIP

Route	Shallow Bedrock (depth 0-25 ft)		HDD Areas		Casing Areas		Organic Soils		Shallow Apparent Groundwater (0-6 ft) +		Perched Groundwater+		Dense Soils +		High Corrosivity Steel		Approximate Route Length		Starting Score *	Total Risk Value	Final Score
	total length (ft)	risk value weight (x 5.0)	total length (ft)	risk value weight (x 3.0)	total length (ft)	risk value weight (x 3.0)	total length (ft)	risk value weight (x 1.0)	total length (ft)	risk value weight (x 0.6)	total length (ft)	risk value weight (x0.3)	total length (ft)	risk value weight (x 0.6)	total length (ft)	risk value weight (x 0.1)	total length (ft)	length deduction weight (x 0.05)			
M1	0	0	3,215	9,645	2,732	8,196	428	428	32,313	19,388	19,563	5,869	7,778	4,667	40,714	4,071	68,917	3,446	69,322	55,710	13,612
M2	0	0	2,860	8,580	2,313	6,939	0	0	29,985	17,991	22,566	6,770	10,564	6,338	48,366	4,837	66,955	3,348	69,322	54,803	14,519
M3	3843	19,215	3,841	11,523	2,581	7,743	0	0	33,472	20,083	16,570	4,971	18,335	11,001	44,693	4,469	72,094	3,605	69,322	82,610	-13,288

+ casing and HDD areas counted twice due to challenging conditions

* Based on average length of the 3 routes

PCCP

Route	Shallow Bedrock (depth 0-25 ft)		HDD Areas		Casing Areas		Organic Soils		Shallow Apparent Groundwater (0-6 ft) +		Perched Groundwater+		Dense Soils +		High Corrosivity Concrete		Approximate Route Length		Starting Score *	Total Risk Value	Final Score
	total length (ft)	risk value weight (x 5.0)	total length (ft)	risk value weight (x 3.0)	total length (ft)	risk value weight (x 3.0)	total length (ft)	risk value weight (x 1.0)	total length (ft)	risk value weight (x 0.6)	total length (ft)	risk value weight (x0.3)	total length (ft)	risk value weight (x 0.6)	total length (ft)	risk value weight (x 0.1)	total length (ft)	length deduction weight (x 0.05)			
M1	0	0	3,215	9,645	2,732	8,196	428	428	32,313	19,388	19,563	5,869	7,778	4,667	428	43	68,917	3,446	69,322	51,681	17,641
M2	0	0	2,860	8,580	2,313	6,939	0	0	29,985	17,991	22,566	6,770	10,564	6,338	0	0	66,955	3,348	69,322	49,966	19,356
M3	3843	19,215	3,841	11,523	2,581	7,743	0	0	33,472	20,083	16,570	4,971	18,335	11,001	0	0	72,094	3,605	69,322	78,141	-8,819

+ casing and HDD areas counted twice due to challenging conditions

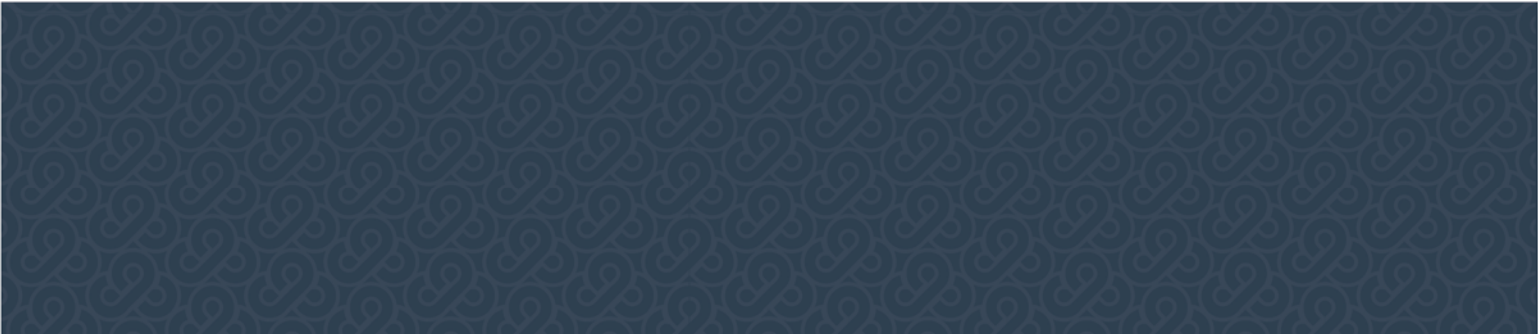
* Based on average length of the 3 routes

PVC or HDPE

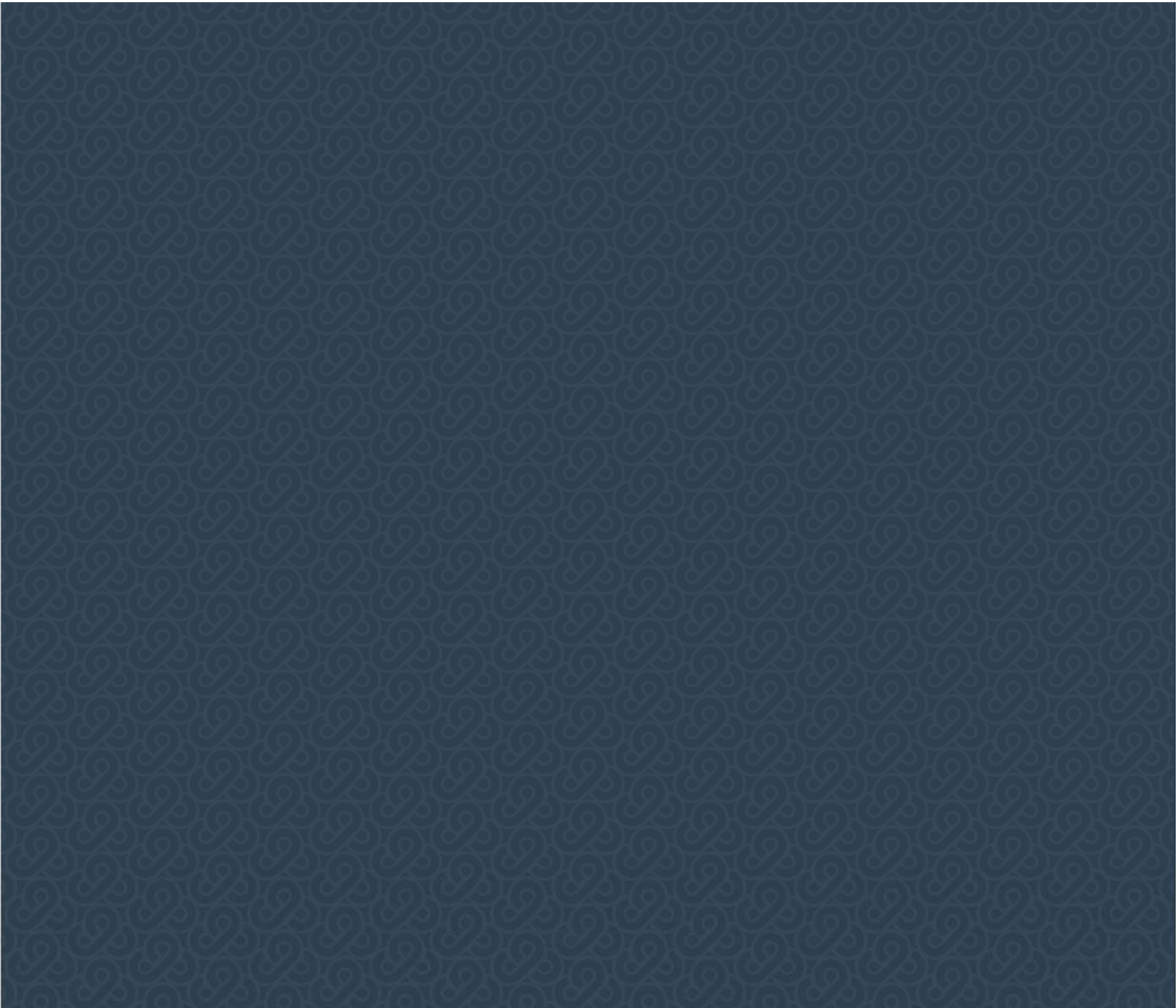
Route	Shallow Bedrock (depth 0-25 ft)		HDD Areas		Casing Areas		Organic Soils		Shallow Apparent Groundwater (0-6 ft) +		Perched Groundwater+		Dense Soils +		Highly Corrosive to PVC or HDPE		Approximate Route Length		Starting Score *	Total Risk Value	Final Score
	total length (ft)	risk value weight (x 5.0)	total length (ft)	risk value weight (x 3.0)	total length (ft)	risk value weight (x 3.0)	total length (ft)	risk value weight (x 1.0)	total length (ft)	risk value weight (x 0.6)	total length (ft)	risk value weight (x0.3)	total length (ft)	risk value weight (x 0.6)	total length (ft)	risk value weight (x 0.1)	total length (ft)	length deduction weight (x 0.05)			
M1	0	0	3,215	9,645	2,732	8,196	428	428	32,313	19,388	19,563	5,869	7,778	4,667	0	0	68,917	3,446	69,322	51,638	17,684
M2	0	0	2,860	8,580	2,313	6,939	0	0	29,985	17,991	22,566	6,770	10,564	6,338	0	0	66,955	3,348	69,322	49,966	19,356
M3	3843	19,215	3,841	11,523	2,581	7,743	0	0	33,472	20,083	16,570	4,971	18,335	11,001	0	0	72,094	3,605	69,322	78,141	-8,819

+ casing and HDD areas counted twice due to challenging conditions

* Based on average length of the 3 routes



Appendix B-11 – WisDOT HSI Borings



TEST BORING No. 1

TEST BORING No. 2

TEST BORING No. 3

TEST BORING No. 4

TEST BORING No. 5

TEST BORING No. 6

TEST BORING No. 7

TEST BORING No. 8

ELEV.

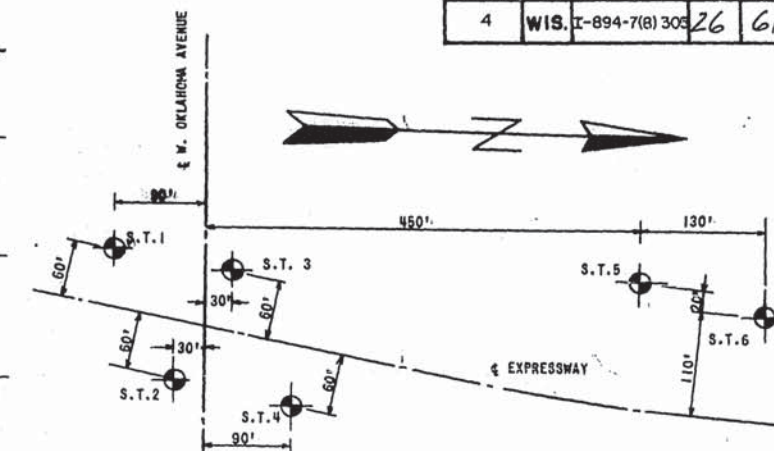
ELEV.	TEST BORING No. 1	TEST BORING No. 2	TEST BORING No. 3	TEST BORING No. 4	TEST BORING No. 5	TEST BORING No. 6	TEST BORING No. 7	TEST BORING No. 8
	S	N	Qu	Mc	S	N	Qu	Mc
200	G.S. 202.3 BLACK TOPSOIL				G.S. 201.1 TOP SOIL			
195	STIFF BROWN SILTY CLAY WITH SOME FINE SAND				STIFF BROWN SILTY CLAY TR. SMALL GRAVEL			
190	VERY STIFF GRAY SILTY CLAY				STIFF BROWN SILTY CLAY TR. SMALL GRAVEL			
185					STIFF BROWN SILTY CLAY TR. SMALL GRAVEL			
180	STIFF GRAY SILTY CLAY SOME SMALL GRAVEL				STIFF BROWN SILTY CLAY TR. SMALL GRAVEL			
175					STIFF BROWN SILTY CLAY TR. SMALL GRAVEL			
170					STIFF BROWN SILTY CLAY TR. SMALL GRAVEL			
165	VERY STIFF				STIFF BROWN SILTY CLAY TR. SMALL GRAVEL			
160					STIFF BROWN SILTY CLAY TR. SMALL GRAVEL			
155	MEDIUM GRAY CLAYEY SAND				STIFF BROWN SILTY CLAY TR. SMALL GRAVEL			
150	TRACE OF GRAVEL				STIFF BROWN SILTY CLAY TR. SMALL GRAVEL			
145	VERY STIFF GRAY SANDY CLAY SOME SMALL GRAVEL				STIFF BROWN SILTY CLAY TR. SMALL GRAVEL			
140	BOTTOM				STIFF BROWN SILTY CLAY TR. SMALL GRAVEL			

* ESTIMATED VALUE

* ESTIMATED VALUE

* ESTIMATED VALUE

* ESTIMATED VALUE



LEGEND AND GENERAL NOTES FOR SUBSURFACE EXPLORATION

- Indicates the test boring number and location.
- Indicates the 24 hour water table reading on the date shown.
- Indicates the sample number.
- Represents the number of blows for each foot of penetration or fraction thereof when using a 140 lb. weight falling free for 30 inches on a 2-inch O.D. Split Spoon Sampler.
- Qu The unconfined compressive strength tests in tons per sq. ft.
- Mc. Represents the natural moisture content of the sample.
- T Indicates a Shelby tube sample. All others are split spoon samples.
- LL. Represents the Liquid Limit.
- PL. Represents the Plastic Limit.
- P.I. Represents the Plasticity Index.

SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN

For the design of the structure foundation, to obtain relative data concerning the character of material in and upon which the foundation might be built, borings and/or soundings were made at points approximately as indicated on this drawing with the log of such exploration data as interpreted for such design purpose as shown. The explorations were made by ordinary and conventional methods and care deemed adequate for such purpose. However, since it is a matter of common knowledge that the exact character of any material and its reaction is difficult to determine from such subsurface exploration and that the kind and character of material at the site where the foundations are built may vary substantially from that indicated by the log, they are made available to the Bidders simply for what they are worth, without any warranty, expressed or implied, that the material to be encountered in building the foundation will conform therewith. If the log is used by the Contractor in making his bid, it is hereby expressly stipulated that the Commission accepts no responsibility for said use.

ESTIMATED PILE TIP ELEVATIONS

TYPE OF PILE	TEST BORING NUMBERS							
	1	2	3	4	5	6	7	8
20" TYP	180	180	180	180				

NORMAL ALLOWABLE BEARING CAPACITIES T/FT²

ELEV.	TEST BORING NUMBERS							
	1	2	3	4	5	6	7	8
180	-	2.0	2.0	-	-	-	-	-
185	-	-	-	-	2.0	2.0	-	-

MILWAUKEE COUNTY EXPRESSWAY COMMISSION WEST EXPRESSWAY

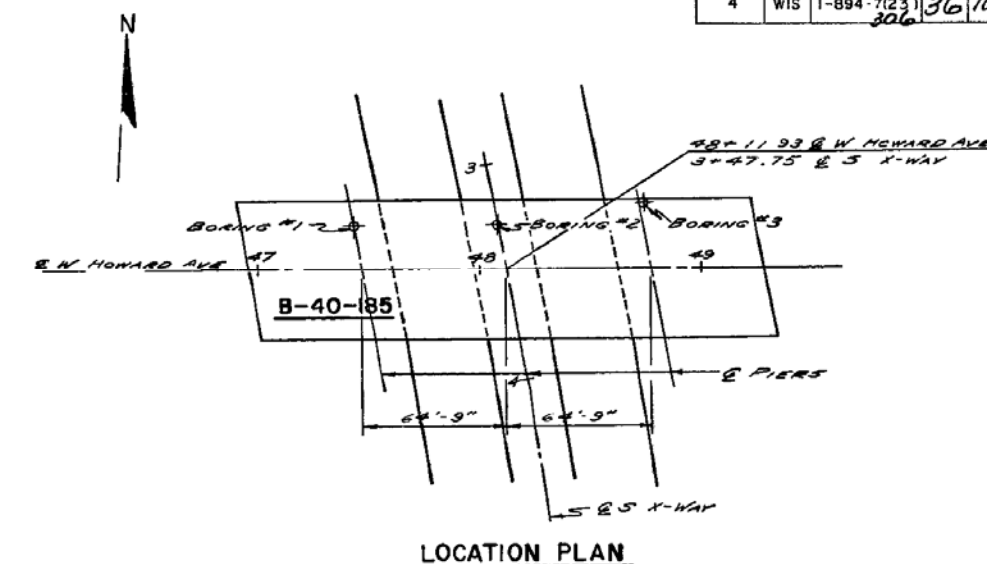
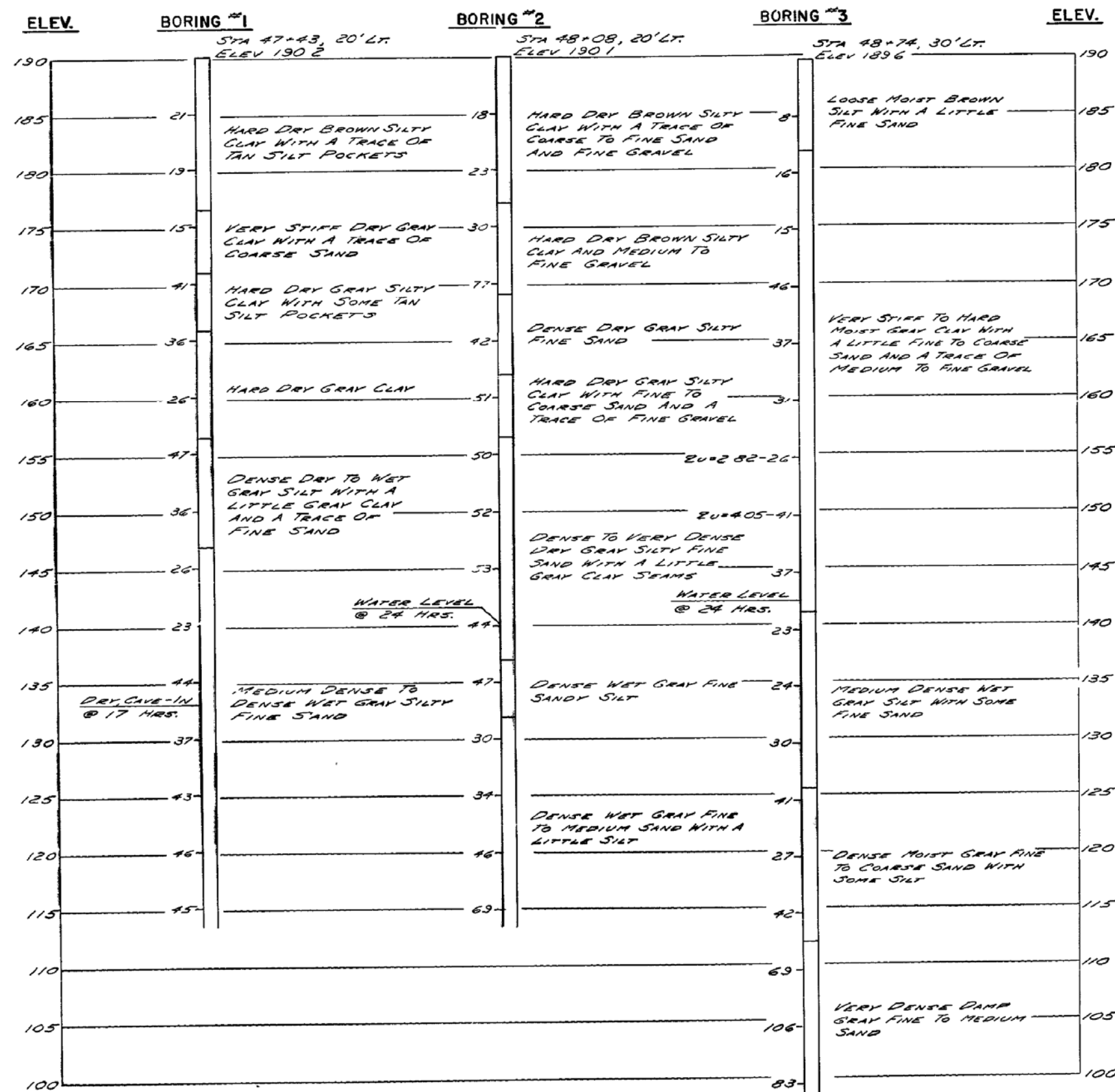
BRIDGE B-40-119 SOUTH BOUND BRIDGE B-40-120 NORTH BOUND
OKLAHOMA AVENUE OVERPASSES
TEST BORING LOGS AND LAB. DATA

DESIGNED H.H.S.
DRAWN C.J.S.
CHECKED C.E.S.JR.
APPROVED A.E.M.

DE LEUW, CATHER & CO.
CONSULTING ENGINEERS
CHICAGO

SCALE:
AS SHOWN.
SHEET NO. S-2

X19964



SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN

FOR THE DESIGN OF THE STRUCTURE FOUNDATION, TO OBTAIN RELATIVE DATA CONCERNING THE CHARACTER OF MATERIAL IN AND UPON WHICH THE FOUNDATION MIGHT BE BUILT, BORINGS AND / OR SOUNDINGS WERE MADE AT POINTS APPROXIMATELY AS INDICATED ON THIS DRAWING WITH THE LOG OF SUCH EXPLORATION DATA AS INTERPRETED FOR SUCH DESIGN PURPOSE AS SHOWN. THE EXPLORATIONS WERE MADE BY ORDINARY AND CONVENTIONAL METHODS AND CARE DEEMED ADEQUATE FOR SUCH PURPOSE. HOWEVER, SINCE IT IS A MATTER OF COMMON KNOWLEDGE THAT THE EXACT CHARACTER OF ANY MATERIAL AND ITS REACTION IS DIFFICULT TO DETERMINE FROM SUCH SUBSURFACE EXPLORATION AND THAT THE KIND AND CHARACTER OF MATERIAL AT THE SITE WHERE THE FOUNDATIONS ARE BUILT MAY VARY SUBSTANTIALLY FROM THAT INDICATED BY THE LOG, THEY ARE MADE AVAILABLE TO THE BIDDERS SIMPLY FOR WHAT THEY ARE WORTH, WITHOUT ANY WARRANTY, EXPRESS OR IMPLIED, THAT THE MATERIAL TO BE ENCOUNTERED IN BUILDING THE FOUNDATION WILL CONFORM THEREWITH. IF THE LOG IS USED BY THE CONTRACTOR IN MAKING HIS BID, IT IS HEREBY EXPRESSLY STIPULATED THAT THE COMMISSION ACCEPTS NO RESPONSIBILITY FOR SAID USE.

UNLESS OTHERWISE SPECIFIED, THE BLOWS PER FOOT INDICATED TO THE LEFT OF EACH BORING'S LOG ARE BASED ON DRIVING A 2" O.D. x 1/4" I.D. SPLIT SPOON SAMPLER WITH A 140 LB. HAMMER HAVING A FREE FALL OF 30 INCHES. THE BLOW COUNT IS TAKEN IN UNDISTURBED SOIL IMMEDIATELY BELOW A CASED OR OPEN HOLE ELIMINATING SIDE FRICTION ON THE DRIVE PIPE. FIGURES TO THE LEFT OF EACH SOUNDING'S LOG INDICATE THE NUMBER OF BLOWS REQUIRED TO DRIVE THE SOUNDING ROD 12" USING A 350 LB. HAMMER FALLING 18".

LEGEND

- BLOWS PER FOOT USING A 140 LB. HAMMER WITH A 30" FALL
- LOCATION OF BLOW COUNT
- UNCONFINED COMPRESSIVE STRENGTH DETERMINED BY LABORATORY TEST, IN TONS / SQ. FT.
- WATER LEVEL AND DRY CAVE-IN AT TIMES SHOWN AFTER COMPLETION OF BORING
- DESCRIPTION OF MATERIAL
- LOCATION OF BLOW COUNT
- UNCONFINED COMPRESSIVE STRENGTH DETERMINED BY LABORATORY TEST, IN TONS / SQ. FT.

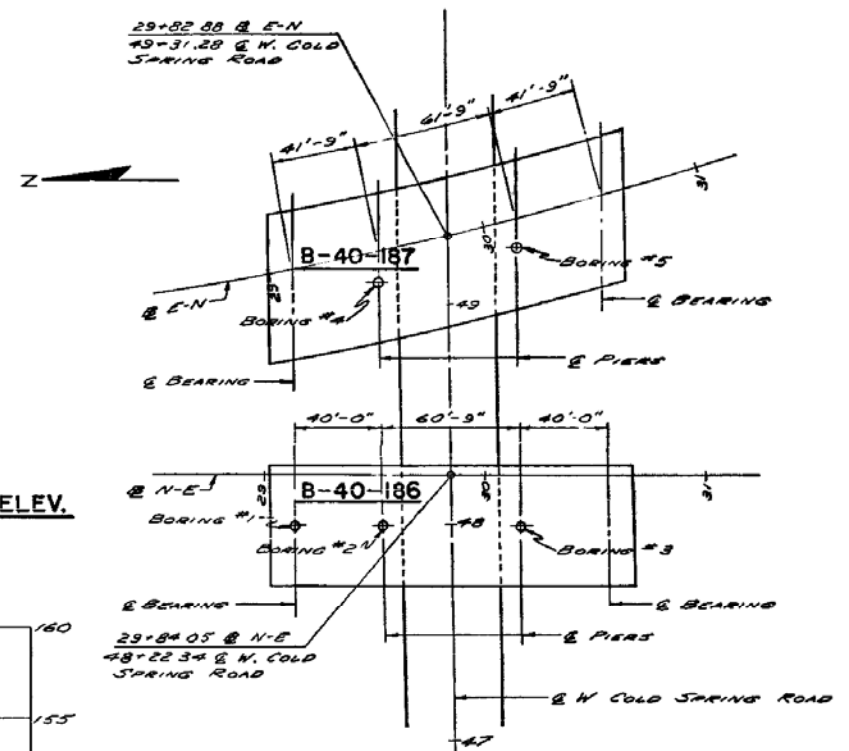
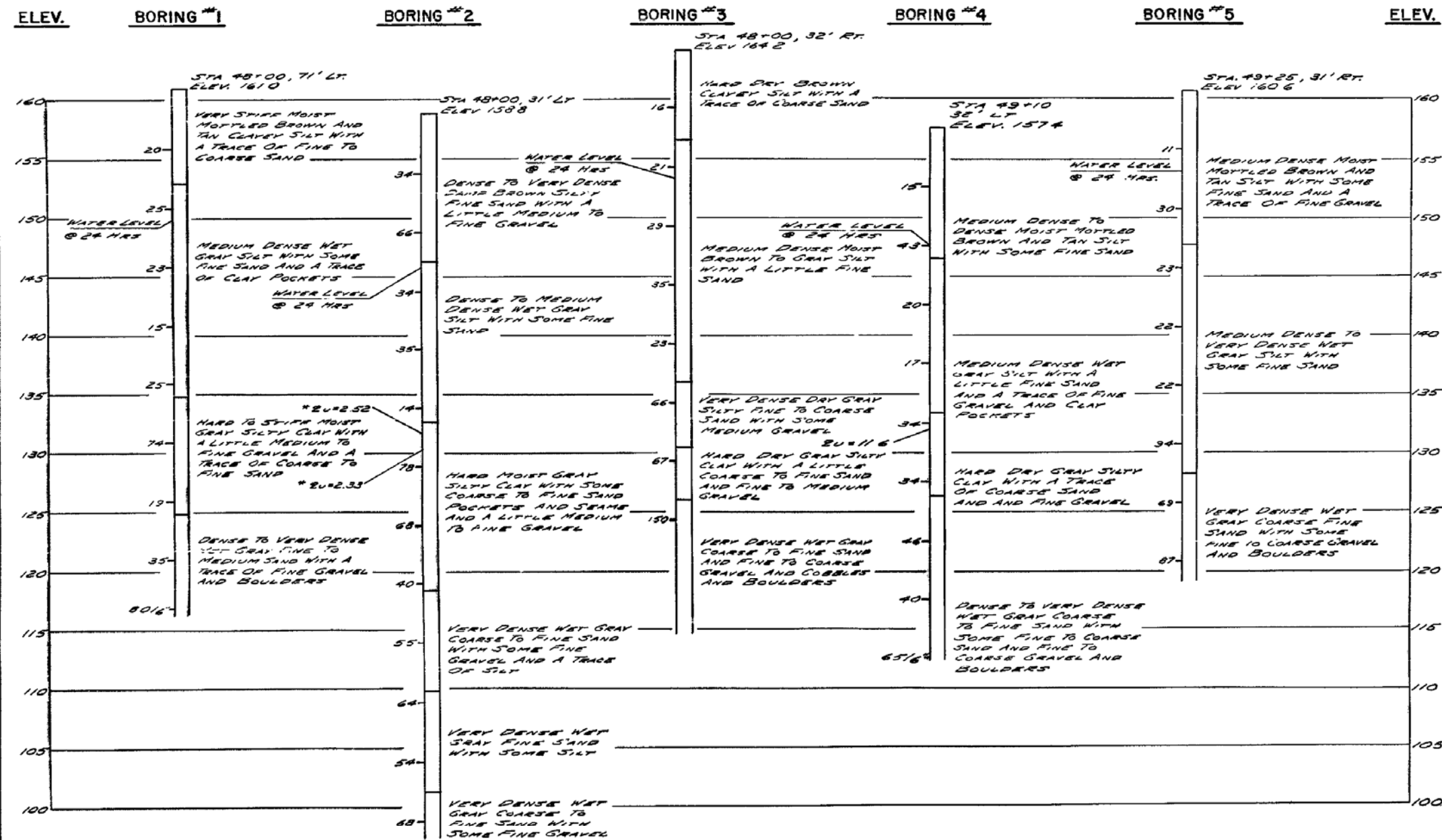
NO.	DATE	REVISION	BY
MILWAUKEE COUNTY EXPRESSWAY COMMISSION			
WEST EXPRESSWAY			
B-40-185			
WEST HOWARD AVENUE UNDERPASS			
LOG OF BORINGS			
SCALE	WARZYN ENGINEERING & SERVICE CO. INC.		
DATE	CONSULTING ENGINEERS		
DATE	MADISON WISCONSIN		
DATE	SHEET 10 OF 11		

106100

SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN

FOR THE DESIGN OF THE STRUCTURE FOUNDATION, TO OBTAIN RELATIVE DATA CONCERNING THE CHARACTER OF MATERIAL IN AND UPON WHICH THE FOUNDATION MIGHT BE BUILT. BORINGS AND/OR SOUNDINGS WERE MADE AT POINTS APPROXIMATELY AS INDICATED ON THIS DRAWING WITH THE LOG OF SUCH EXPLORATION DATA AS INTERPRETED FOR SUCH DESIGN PURPOSE AS SHOWN. THE EXPLORATIONS WERE MADE BY ORDINARY AND CONVENTIONAL METHODS AND CARE DEEMED ADEQUATE FOR SUCH PURPOSE. HOWEVER, SINCE IT IS A MATTER OF COMMON KNOWLEDGE THAT THE EXACT CHARACTER OF ANY MATERIAL AND ITS REACTION IS DIFFICULT TO DETERMINE FROM SUCH SUBSURFACE EXPLORATION AND THAT THE KIND AND CHARACTER OF MATERIAL AT THE SITE WHERE THE FOUNDATIONS ARE BUILT MAY VARY SUBSTANTIALLY FROM THAT INDICATED BY THE LOG, THEY ARE MADE AVAILABLE TO THE BIDDERS SIMPLY FOR WHAT THEY ARE WORTH, WITHOUT ANY WARRANTY, EXPRESS OR IMPLIED, THAT THE MATERIAL TO BE ENCOUNTERED IN BUILDING THE FOUNDATION WILL CONFORM THEREWITH. IF THE LOG IS USED BY THE CONTRACTOR IN MAKING HIS BID, IT IS HEREBY EXPRESSLY STIPULATED THAT THE COMMISSION ACCEPTS NO RESPONSIBILITY FOR SAID USE.

UNLESS OTHERWISE SPECIFIED, THE BLOWS PER FOOT INDICATED TO THE LEFT OF EACH BORING LOG ARE BASED ON DRIVING A 2" O.D. x 14" I.D. SPLIT SPOON SAMPLER WITH A 140 LB. HAMMER HAVING A FREE FALL OF 30 INCHES. THE BLOW COUNT IS TAKEN IN UNDISTURBED SOIL IMMEDIATELY BELOW A CASED OR OPEN HOLE ELIMINATING SIDE FRICTION ON THE DRIVE PIPE. FIGURES TO THE LEFT OF EACH SOUNDING LOG INDICATE THE NUMBER OF BLOWS REQUIRED TO DRIVE THE SOUNDING ROD 12" USING A 350 LB. HAMMER FALLING 18".



LOCATION PLAN

BLOWS PER FOOT USING A 140 LB HAMMER WITH A 30" FALL

2U=405-15

DESCRIPTION OF MATERIAL

LOCATION OF BLOW COUNT

UNCONFINED COMPRESSIVE STRENGTH DETERMINED BY LABORATORY TEST ON SPLIT SPOON SAMPLE, IN TONS/50 FT

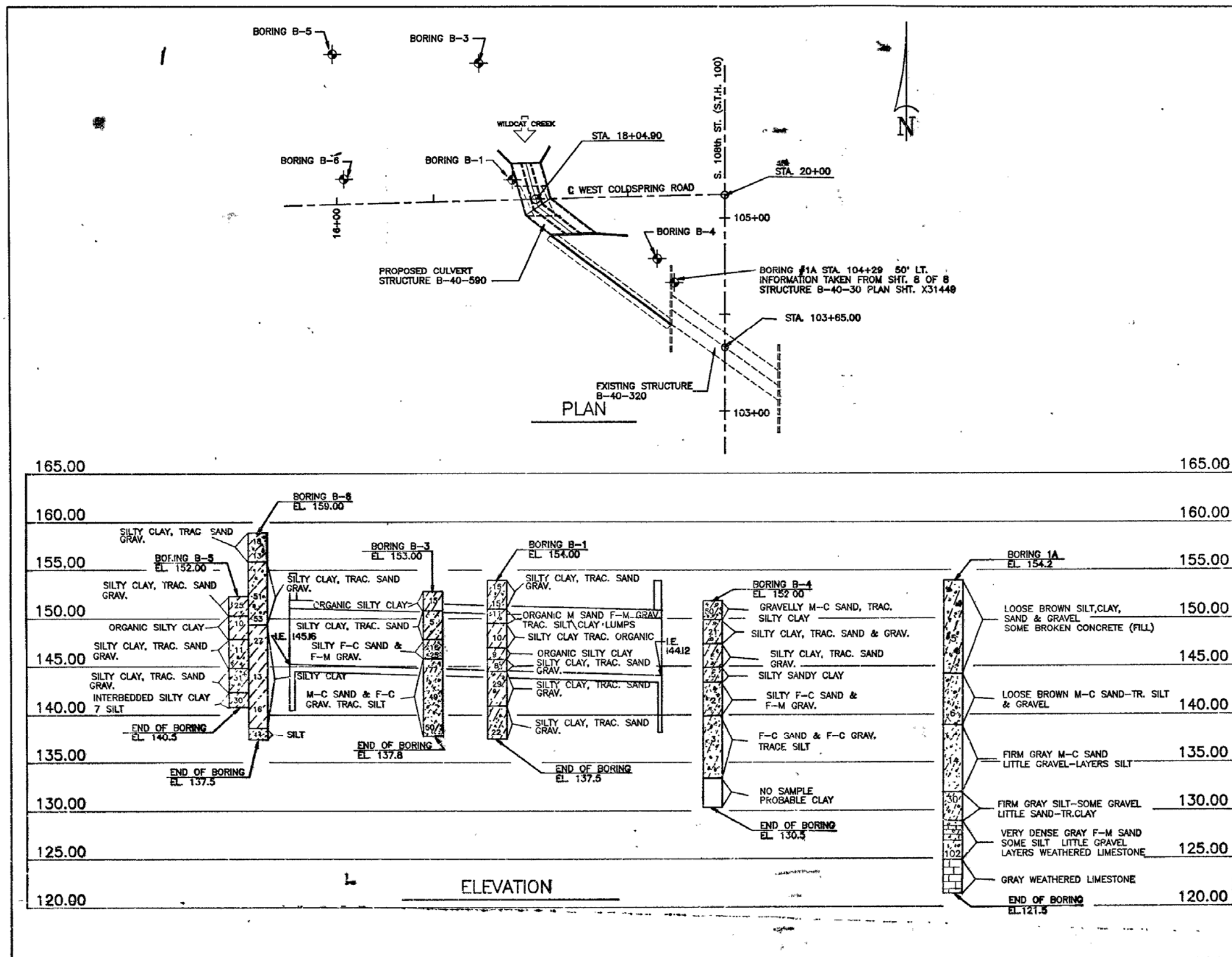
*2U=UNCONFINED COMPRESSIVE STRENGTH DETERMINED BY LABORATORY TEST ON 5" x 5" x 10" TUBE SAMPLE, IN TONS/50 FT

WATER LEVEL AT TIMES SHOWN AFTER COMPLETION OF BORING

LEGEND

NO	DATE	REVISION	BY
MILWAUKEE COUNTY EXPRESSWAY COMMISSION			
SOUTH EXPRESSWAY			
B-40-186 & 187			
WEST COLD SPRING ROAD OVERPASSES			
LOG OF BORINGS			
SCALE	NO SCALE	WARZYN ENGINEERING & SERVICE CO. INC.	
MADE	GBH	CONSULTING ENGINEERS	
TRCD	GBH	MADISON	
CHK	MIE	SHEET 8 OF 8	

726960



STATE PROJECT NUMBER	SHEET NO.
2980-01-71	8.1

ABBREVIATIONS		
F FINE	M MEDIUM	C COARSE
WS WEATHERED	SO SOUND	

TOPSOIL	SILT	SANDSTONE
SAND	PEAT	LIMESTONE
GRAVEL	CLAY	IGNEOUS ROCK

LEGEND OF PROBING

95/8 = 95 blows for 8' Penetration

Probing taken with a 350# wt. Falling on a 2" O.D. Point.

Probing No. Sta. Elevation

7 Average Blows Per Foot

Refusal 95/8

LEGEND OF BORING

Elev. Boring No. Sta.

Unconfined Strength 7.7

Blows per Ft. Using 140# Wt. Falling 30"

Wash Sample *

Shelby Tube S.T.

Ground Water Elevation

No Ground Water Observed Above This Elevation

Sandy Gravel

F. Boulders or Cobbles

Sand

Silty Clay

So Limestone

Unless otherwise specified, the blows per foot at the locations indicated are based on driving a 2" O.D. X 1.4" I.D. split spoon sampler with a 140# hammer having a free fall of 30". The blow count is taken in undisturbed soil immediately below a cased or open hole eliminating side friction on the drive pipe.

SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN AND BIDDERS INFORMATION

To obtain relative data concerning the character of material in and upon which the foundation might be built, borings and/or soundings were made at points approximately as indicated on this drawing. The data presented herein represents the findings of the subsurface explorations made. However, because the depths investigated are limited and the area of the borings and/or soundings is very small in relation to the entire area, the Division of Highways does not warrant conditions below the depths investigated or that the classification of material encountered in these investigations is necessarily typical of the entire site.

No.	Date	Revision	By

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

STRUCTURE B-40-590

Const. Spec. WIS. 88 Drawn By JY Plans Checked TAZ

SUBSURFACE EXPLORATION

SHEET 2 OF 10

X 83406

B-40-590

STATE PROJECT NUMBER
2980-02-70

SHEET NO.
8.2

ABBREVIATIONS
F — Fine
Ws — Weathered
M — Medium
C — Coarse
So — Sound

MATERIAL SYMBOLS
Topsoil
Sand
Gravel
Silt
Peat
Clay
Sandstone
Limestone
Igneous Rock

LEGEND OF PROBING
95/6=95 Blows for 6" Penetration
Probing taken with a 350# wt. Falling 18" on a 2" O. D. Point.

Probing No.
Sta.
Elevation
7 Average Blows Per Foot
Refusal 95 6

LEGEND OF BORING
Unconfined Strength
Blows Per Ft. Using 140# Wt. Falling 30"
Wash Sample
Shelby Tube — S. T.
Ground Water Elevation
No Ground Water Observed Above This Elevation

Boring No.
Sta.
Elev.
Sandy Gravel
Boulders or Cobbles
Sand
Silty Clay
So
Limestone

Unless otherwise specified, the blows per foot at the locations indicated are based on driving a 2" O. D. x 1.4" I. D. split spoon sampler with a 140# hammer having a free fall of 30". The blow count is taken in undisturbed soil immediately below a cased or open hole eliminating side friction on the drive pipe.

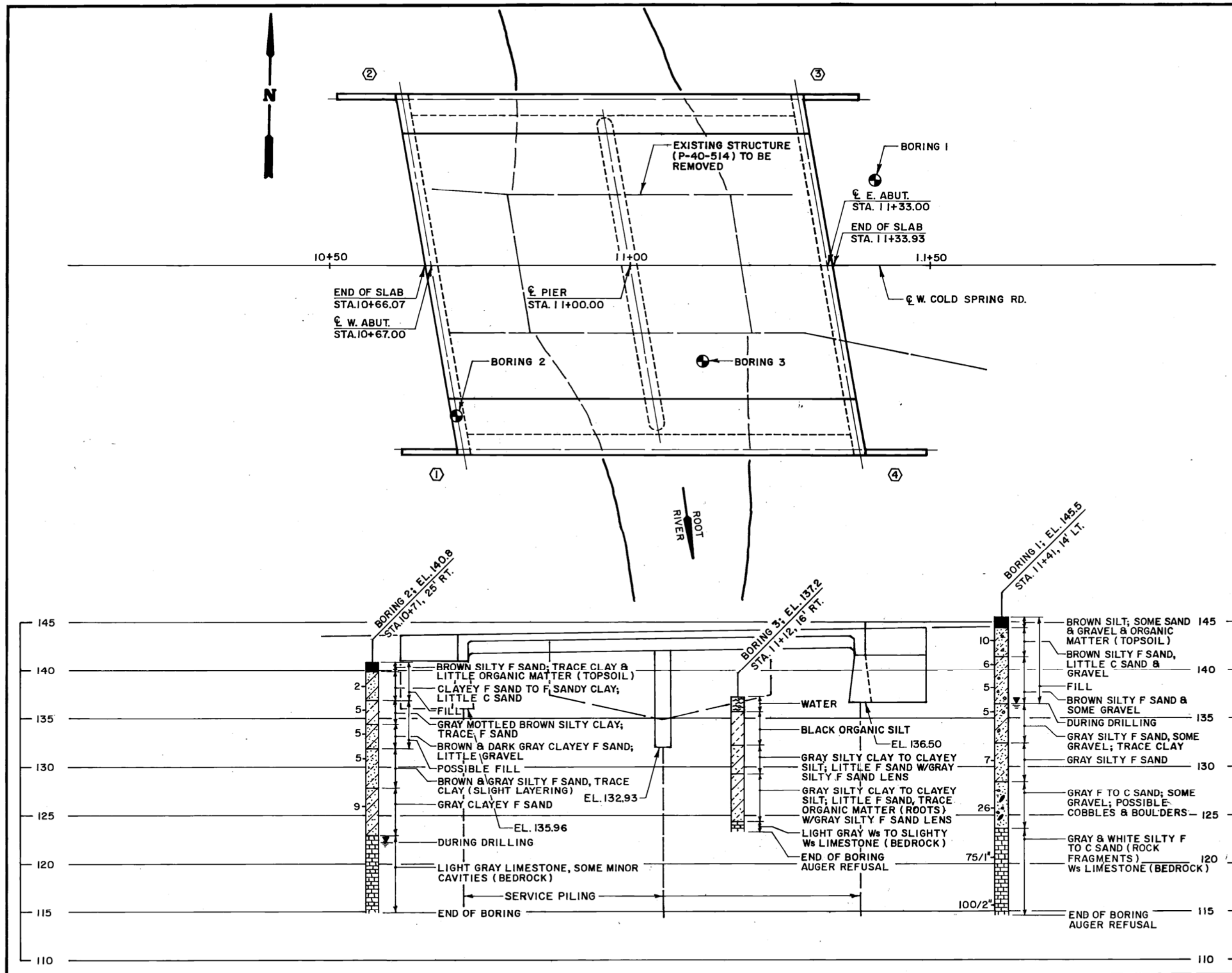
SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN AND BIDDERS INFORMATION
To obtain relative data concerning the character of material in and upon which the foundation might be built, borings and/or soundings were made at points approximately as indicated on this drawing. The data presented herein represents the findings of the subsurface explorations made. However, because the depths investigated are limited and the area of the borings and/or soundings is very small in relation to the entire area, the Division of Highways does not warrant conditions below the depths investigated or that the classification of material encountered in these investigations is necessarily typical of the entire site.

No. Date Revision By

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STRUCTURE B-40-637
Const. Spec. 1989 Drawn By PCC Plans Checked PGC

SUBSURFACE EXPLORATION

SHEET 3 OF 11



2995-02-70

8.10

SUBSURFACE EXPLORATION FOR FOUNDATION
DESIGN AND BIDDERS INFORMATION
FOR THE DESIGN OF THE STRUCTURE FOUNDATION, TO
OBTAIN RELATIVE DATA CONCERNING THE CHARACTER OF
MATERIAL IN AND UPON WHICH THE FOUNDATION MIGHT
BE BUILT, BORINGS AND/OR SOUNDINGS WERE MADE AT
POINTS APPROXIMATELY AS INDICATED ON THIS DRAWING
WITH THE LOG OF SUCH EXPLORATION DATA AS INTER-
PRETED FOR SUCH DESIGN PURPOSE AS SHOWN. THE EX-
PLORATIONS WERE MADE BY ORDINARY AND CONVENTIONAL
METHODS AND CARE DEEMED ADEQUATE FOR SUCH PUR-
POSE. HOWEVER, SINCE IT IS A MATTER OF COMMON
KNOWLEDGE THAT THE EXACT CHARACTER OF ANY
MATERIAL AND ITS REACTION IS DIFFICULT TO DETERMINE
FROM SUCH SUBSURFACE EXPLORATION AND THAT THE
KIND AND CHARACTER OF MATERIAL AT THE SITE WHERE
THE FOUNDATIONS ARE BUILT MAY VARY SUBSTANTIALLY
FROM THAT INDICATED BY THE LOG, THEY ARE MADE
AVAILABLE TO THE BIDDERS SIMPLY FOR WHAT THEY
ARE WORTH, WITHOUT ANY WARRANTY, EXPRESSED OR
IMPLIED THAT THE MATERIAL TO BE ENCOUNTERED IN
BUILDING THE FOUNDATION WILL CONFORM THEREWITH.
IF THE LOG IS USED BY THE CONTRACTOR IN MAKING
HIS BID, IT IS HEREBY EXPRESSLY STIPULATED THAT
THE DIVISION OF HIGHWAYS ACCEPTS NO RESPONSIBILITY
FOR SAID USE.

UNLESS OTHERWISE SPECIFIED, THE BLOWS PER
FOOT AT THE LOCATIONS INDICATED ARE BASED ON
DRIVING A 2" OD x 1.4" ID SPLIT SPOON SAMPLER WITH
A 140 LB. HAMMER HAVING A FREE FALL OF 30".
THE BLOW COUNT IS TAKEN IN UNDISTURBED SOIL
IMMEDIATELY BELOW A CASED OR OPEN HOLE ELIMINATING
SIDE FRICTION ON THE DRIVE PIPE.

LEGEND OF PROBING

ELEV. STA. PROBE #
7 AVERAGE BLOWS
PER FT.

REFUSAL 95/6

95/6 = 95 BLOWS FOR 6" PENETRATION
PROBING TAKEN WITH A 350# WT.
FALLING 18" ON A 2" O.D. POINT

LEGEND OF BORING

ELEV. STA. BORING #
UNCONFINED
STRENGTH
BLOWS PER FT.
USING 140# WT.
FALLING 30"
WASH SAMPLE
SHELBY TUBE
GROUND WATER
ELEVATION
NO GROUND WATER
OBSERVED ABOVE
THIS ELEVATION
TOPSOIL
GRAVEL
SAND
BOULDERS OR
COBBLES
SILT
PEAT
CLAY
LIMESTONE

No.	Date	Revision	By

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

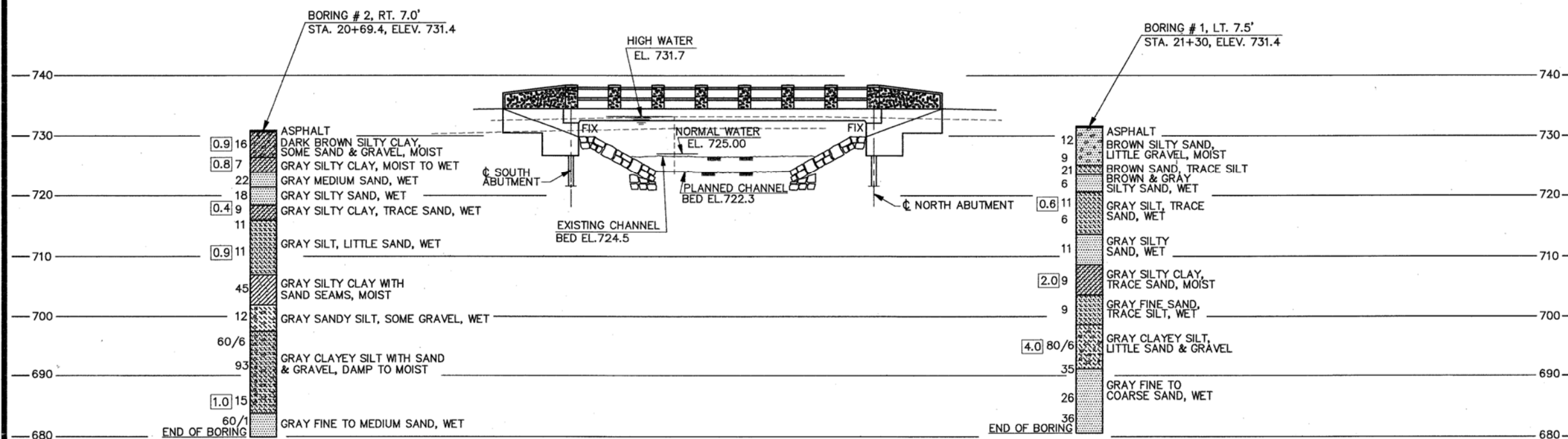
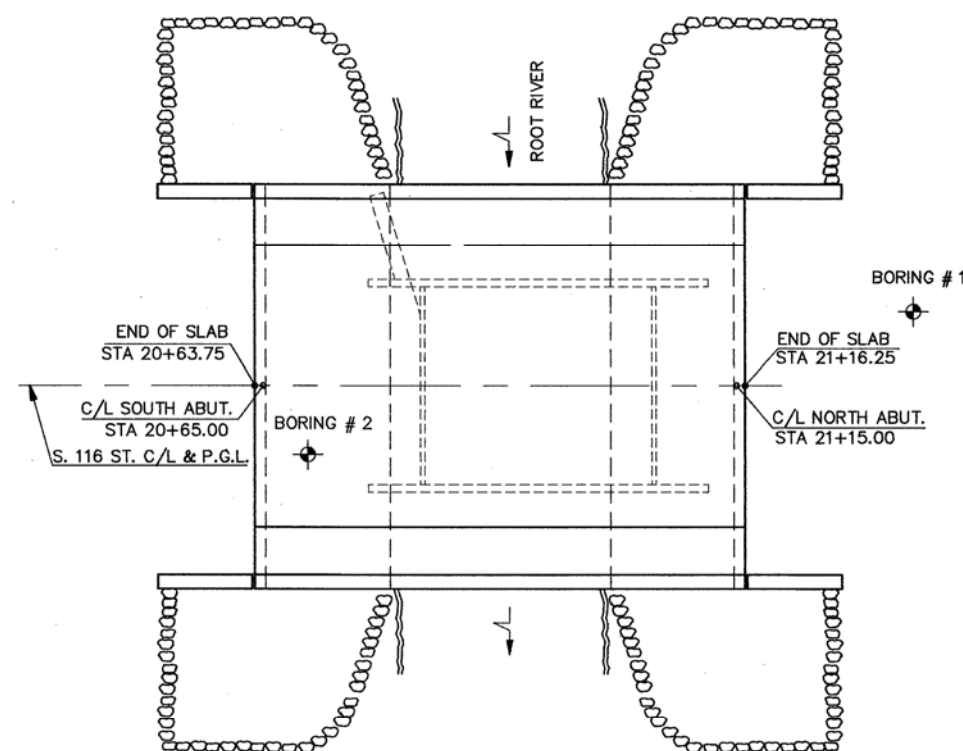
STRUCTURE B-40-642

Const. Spec.	1989	Drawn By	YNN	Plans Checked	JFK/ZMS
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SUBSURFACE
EXPLORATION

SHEET 3 OF 7

DECEMBER 1994



STATE PROJECT NUMBER
2400-04-72

ABBREVIATIONS
F— FINE M— MEDIUM C— COARSE
WS— WEATHERED SO— SOUND

MATERIAL SYMBOLS
TOPSOIL SILT SANDSTONE
SAND PEAT LIMESTONE
GRAVEL CLAY IGNEOUS ROCK

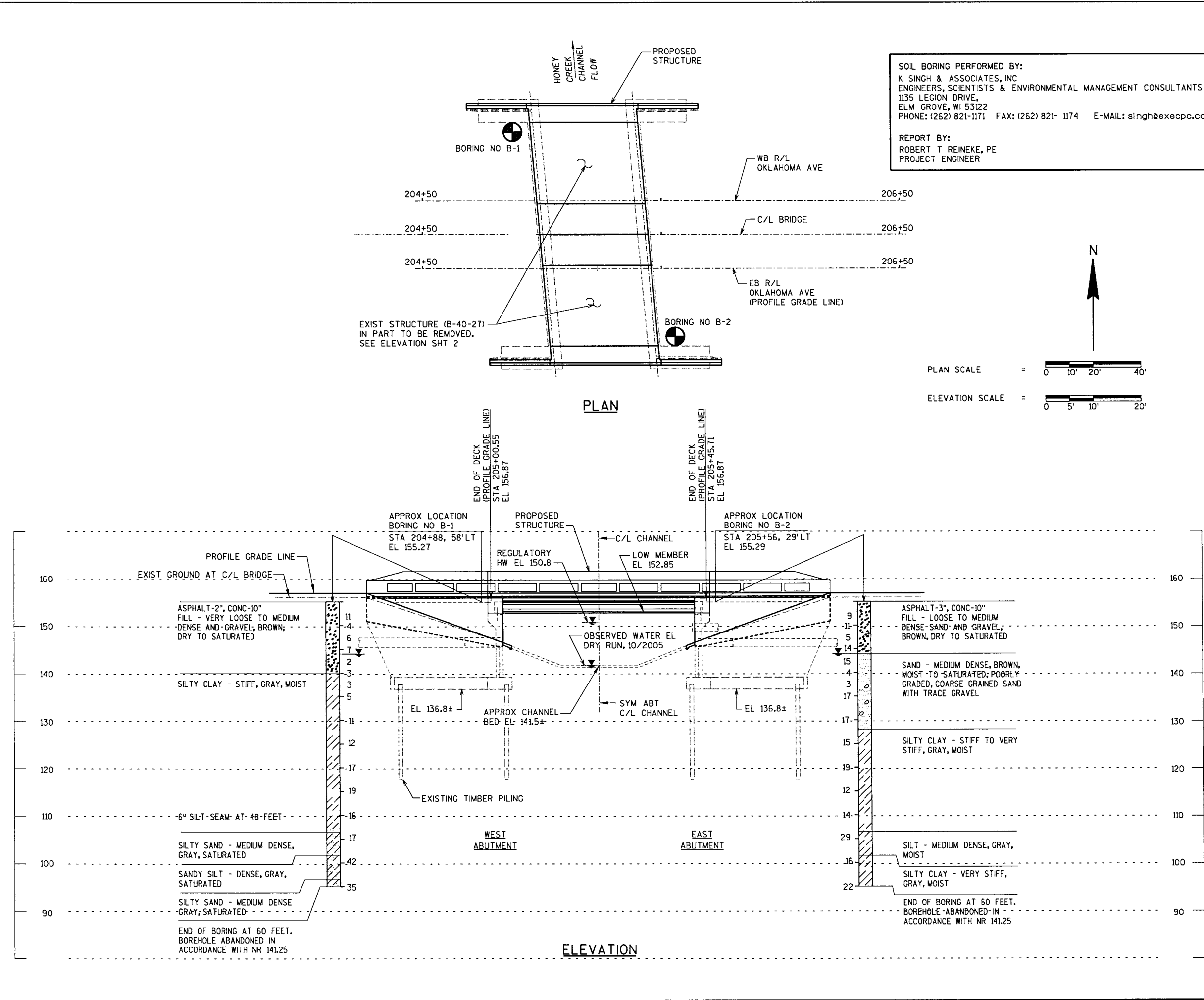
LEGEND OF PROBING
PROBING NO.
STA.
ELEVATION
95/6=95 BLOWS FOR 6"
PENETRATION
PROBING TAKEN WITH
A 350* WT.
FALLING 18" ON A 2"
O.D. POINT.
7 AVERAGE BLOWS PER FOOT
REFUSAL 95/6

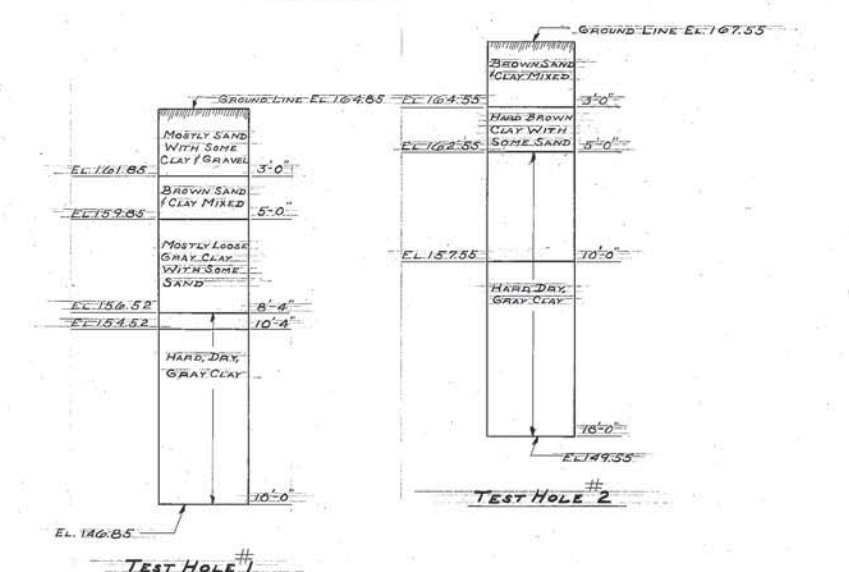
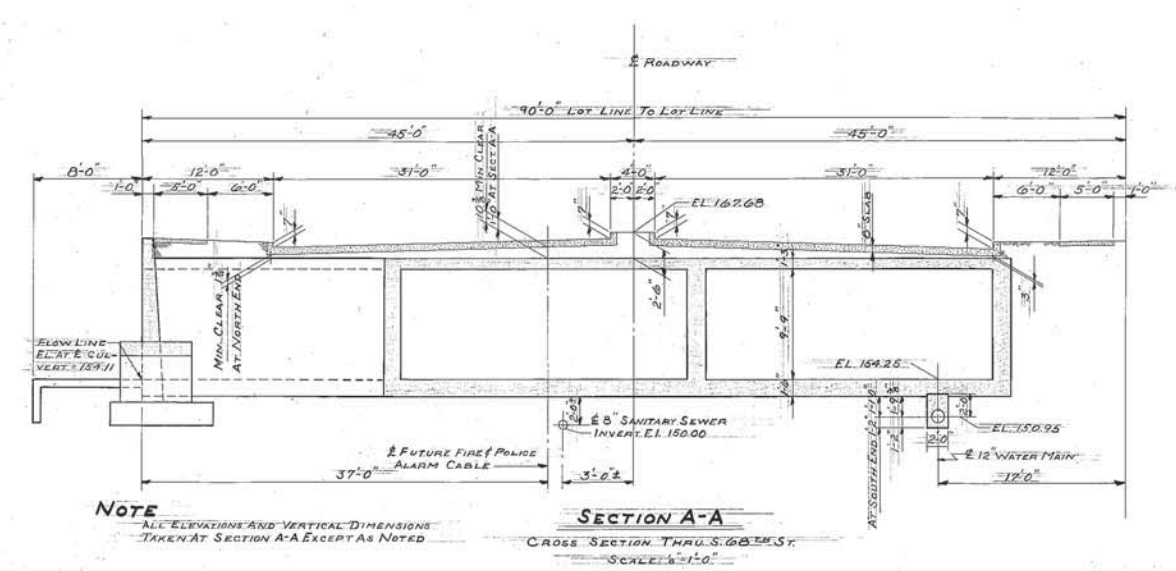
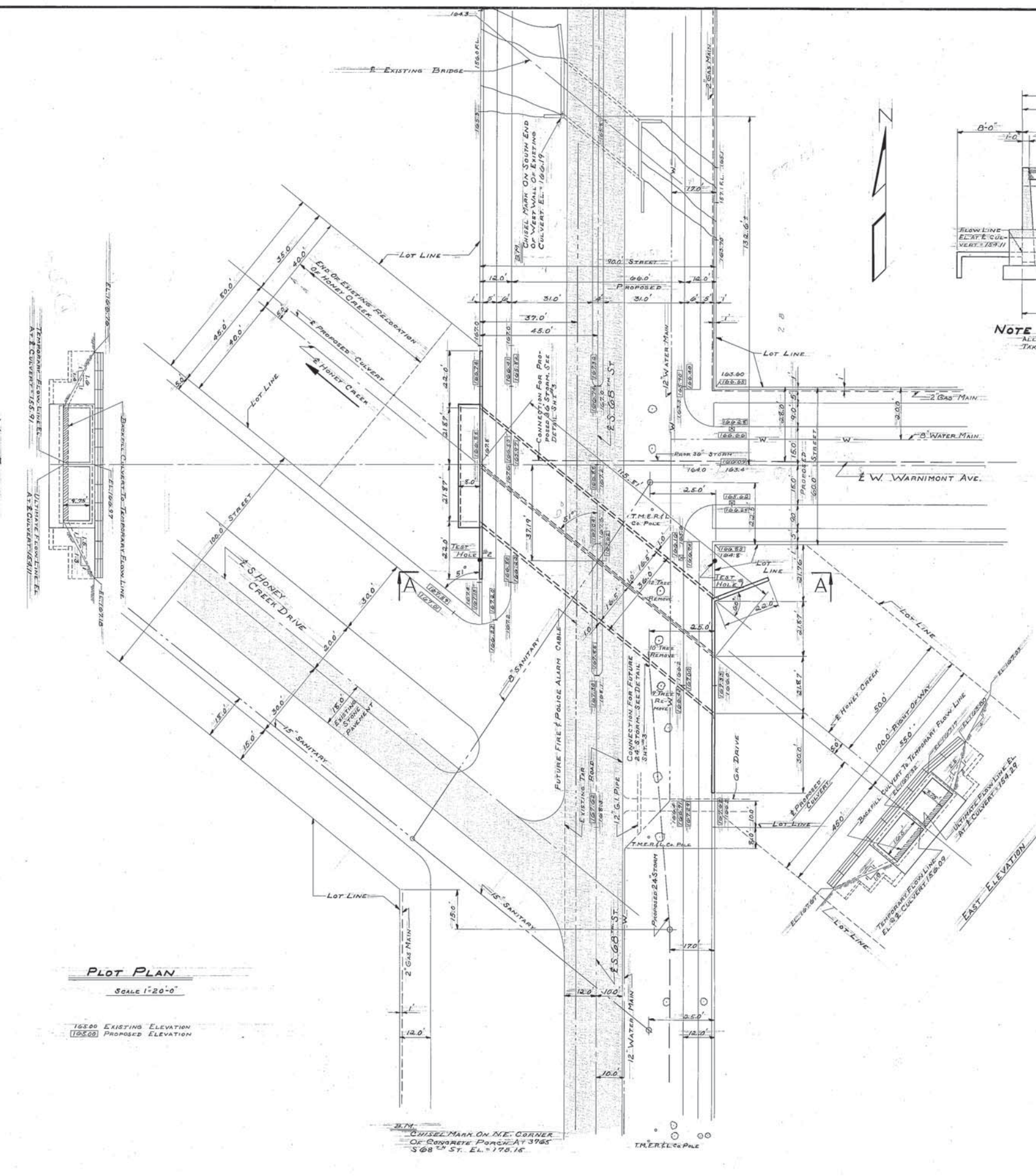
LEGEND OF BORING
BORING NO.
STA.
ELEV.
UNCONFINED
STRENGTH → 7.7
BLOWS PER FT.
USING 140* WT.
FALLING 30"
WASH SAMPLE
SHELBY TUBE — S.T.
GROUND WATER
ELEVATION
NO GROUND WATER
OBSERVED ABOVE
THIS ELEVATION
SANDY GRAVEL
F.
BOULDERS OR
COBBLES
SAND
SILTY CLAY
SO
LIMESTONE

UNLESS OTHERWISE SPECIFIED, THE BLOWS PER FOOT AT THE LOCATIONS INDICATED ARE BASED ON DRIVING A 2" O.D. X 1.4" I.D. SPLIT SPOON SAMPLER WITH A 140* HAMMER HAVING A FREE FALL OF 30". THE BLOW COUNT IS TAKEN IN UNDISTURBED SOIL IMMEDIATELY BELOW A CASED OR OPEN HOLE ELIMINATING SIDE FRICTION ON THE DRIVE PIPE.

SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN AND BIDDERS INFORMATION
TO OBTAIN RELATIVE DATA CONCERNING THE CHARACTER OF MATERIAL IN AND UPON WHICH THE FOUNDATION MIGHT BE BUILT, BORINGS AND/OR SOUNDINGS WERE MADE AT POINTS APPROXIMATELY AS INDICATED ON THIS DRAWING. THE DATA PRESENTED HEREIN REPRESENTS THE FINDINGS OF THE SUBSURFACE EXPLORATIONS MADE. HOWEVER, BECAUSE THE DEPTHS INVESTIGATED ARE LIMITED AND THE AREA OF THE BORINGS AND/OR SOUNDINGS IS VERY SMALL IN RELATION TO THE ENTIRE AREA, THE WISCONSIN DEPARTMENT OF TRANSPORTATION DOES NOT WARRANT CONDITIONS BELOW THE DEPTHS INVESTIGATED OR THAT THE CLASSIFICATION OF MATERIAL ENCOUNTERED IN THESE INVESTIGATIONS IS NECESSARILY TYPICAL OF THE ENTIRE SITE.

NO.	DATE	REVISION	BY
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STRUCTURES DESIGN SECTION			
STRUCTURE B-40-728			
CONST SPEC	2008	DRAWN BY DLF	PLANS CK'D. JAJ
SUBSURFACE EXPLORATION			SHEET 4 OF 24
PLANS RECEIVED			





PLOT PLAN
SCALE 1"=20'-0"

165.00 EXISTING ELEVATION
165.20 PROPOSED ELEVATION

CHISEL MARK ON N.E. CORNER
OF CONCRETE PAVEMENT AT 3965
S 68th ST. EL. 170.16

DEPARTMENT OF PUBLIC WORKS
BUREAU OF BRIDGES AND PUBLIC BUILDINGS
CITY OF MILWAUKEE

SOUTH 68TH STREET BRIDGE
OVER HONEY CREEK AT W. WARNIMONT AVE.

LOCATION PLAN

REVISIONS		
MARK	DATE	BY
A		
B		
C		
D		
E		
F		
G		
H		
I		
J		
K		
L		
M		

DESIGNED BY: R.L.K.

DRAWN BY: R.L.K.

APPROVED: _____

TRACED BY: K.E.G. DATE: 4-26-57

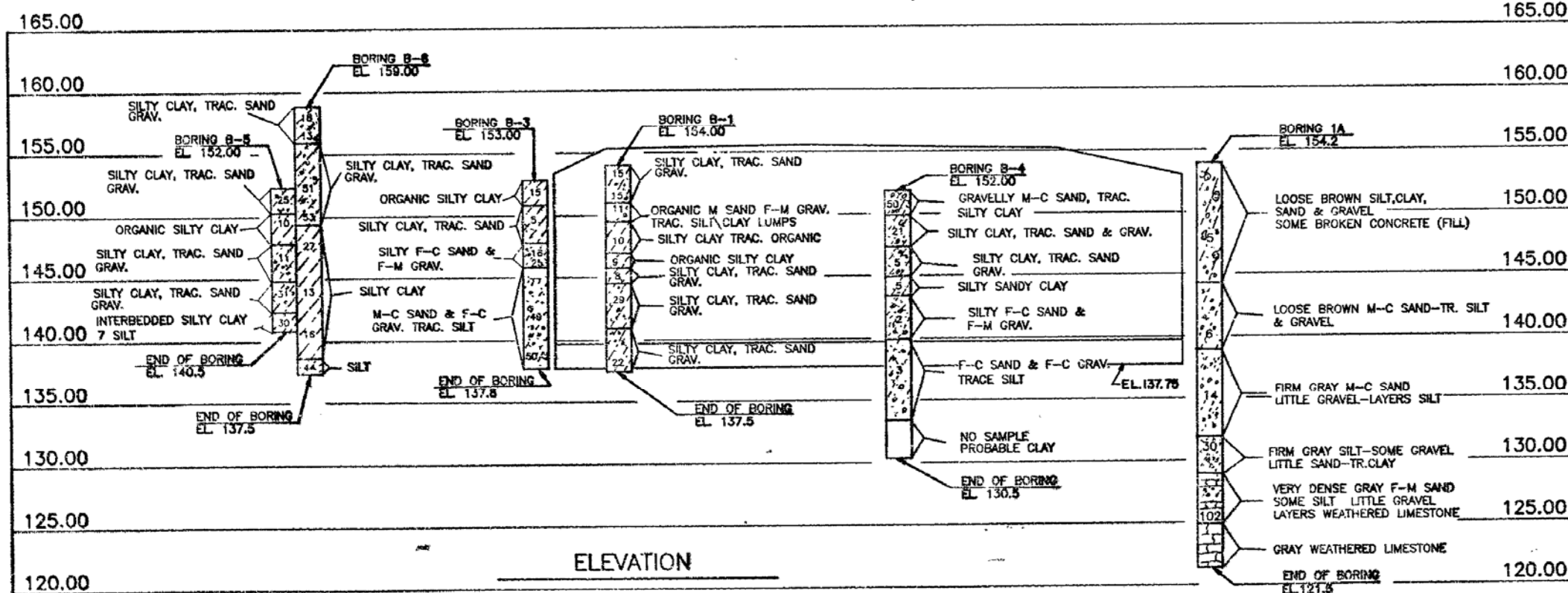
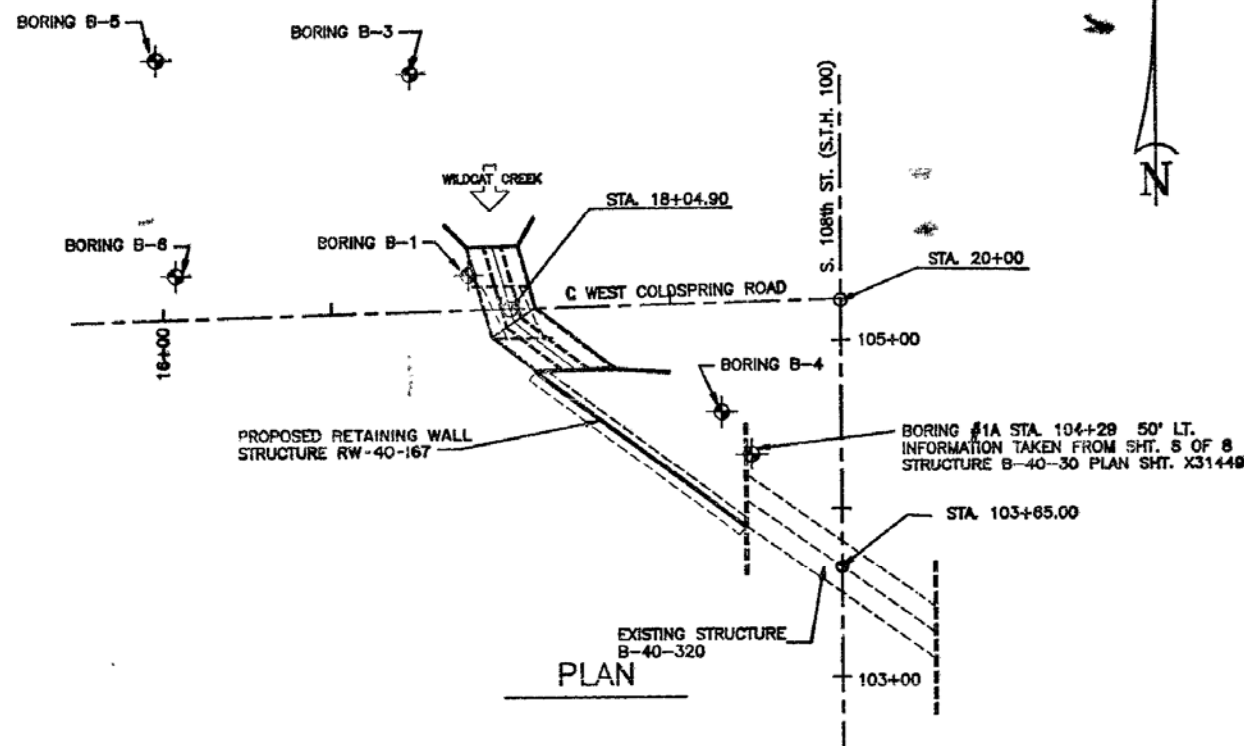
CHECKED BY: P.C.B. DATE: 4-29-57

SCALE: AS SHOWN

DATE: 5-2-57 SHEET NUMBER: 1

DATE: 5-15-57 SET OF: 5 SHEETS

DATE: 5-16-57 JOB NO. 794-028



STATE PROJECT NUMBER		SHEET NO.	
2980-01-71		814	

ABBREVIATIONS			
F FINE	M MEDIUM	C COARSE	
WS WEATHERED	SO SOUND		

TOPSOIL	SILT	SANDSTONE
SAND	PEAT	LIMESTONE
GRAVEL	CLAY	IGNEOUS ROCK

LEGEND OF PROBING

95/6 = 95 blows for 6' Penetration

Probing taken with a 350# wt. Falling on a 2" O.D. Point.

Probing No. Sta. Elevation 7 Average Blows Per Foot Refusal 95/6

LEGEND OF BORING

Elev. Boring No. Sta.

Unconfined Strength 7.7

Blows per Ft. Using 140# Wt. Falling 30"

Wash Sample *

Shelby Tube S.T.

Ground Water Elevation

No Ground Water Observed Above This Elevation

Sandy Gravel

F. Boulders or Cobbles

Sand

Silty Clay

So

Limestone

Unless otherwise specified, the blows per foot at the locations indicated are based on driving a 2" O.D. X 1.4" I.D. split spoon sampler with a 140# hammer having a free fall of 30". The blow count is taken in undisturbed soil immediately below a cased or open hole eliminating side friction on the drive pipe.

SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN AND BIDDERS INFORMATION

To obtain relative data concerning the character of material in and upon which the foundation might be built, borings and/or soundings were made at points approximately as indicated on this drawing. The data presented herein represents the findings of the subsurface explorations made. However, because the depths investigated are limited and the area of the borings and/or soundings is very small in relation to the entire area, the Division of Highways does not warrant conditions below the depths investigated or that the classification of material encountered in these investigations is necessarily typical of the entire site.

No.	Date	Revision	By

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

STRUCTURE RW-40-167

Const. Spec. WS. 88 By JY From Checked TAZ

SUBSURFACE EXPLORATION

SHEET 5 OF 5

X83407

RW-40-167

30-MAR-1998 11:00

SHEET	PROJECT	DATE	BY
4	FOIP2(V)	105	272

SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN

FOR THE DESIGN OF THE STRUCTURE FOUNDATION, TO OBTAIN RELATIVE DATA CONCERNING THE CHARACTER OF MATERIAL IN AND UPON WHICH THE FOUNDATION MIGHT BE BUILT, BORINGS AND/OR SOUNDINGS WERE MADE AT POINTS APPROXIMATELY AS INDICATED ON THIS DRAWING WITH THE LOG OF SUCH EXPLORATION DATA AS INTERPRETED FOR SUCH DESIGN PURPOSE AS SHOWN THE EXPLORATIONS WERE MADE BY ORDINARY AND CONVENTIONAL METHODS AND CARE DEEMED ADEQUATE FOR SUCH PURPOSE HOWEVER, SINCE IT IS A MATTER OF COMMON KNOWLEDGE THAT THE EXACT CHARACTER OF ANY MATERIAL AND ITS REACTION IS DIFFICULT TO DETERMINE FROM SUCH SUBSURFACE EXPLORATION AND THAT THE KIND AND CHARACTER OF MATERIAL AT THE SITE WHERE THE FOUNDATIONS ARE BUILT MAY VARY SUBSTANTIALLY FROM THAT INDICATED BY THE LOG THEY ARE MADE AVAILABLE TO THE BIDDERS SIMPLY FOR WHAT THEY ARE WORTH, WITHOUT ANY WARRANTY, EXPRESSED OR IMPLIED THAT THE MATERIAL TO BE ENCOUNTERED IN BUILDING THE FOUNDATION WILL CONFORM THEREWITH. IF THE LOG IS USED BY THE CONTRACTOR IN MAKING HIS BID, IT IS HEREBY EXPRESSLY STIPULATED THAT THE COMMISSION ACCEPTS NO RESPONSIBILITY FOR SAID USE.

UNLESS OTHERWISE SPECIFIED THE BLOWS PER FOOT AT THE LOCATIONS INDICATED ARE BASED ON DRIVING A 2" OD x 1.4" ID SPLIT SPOON SAMPLER WITH A 140 LB. HAMMER HAVING A FREE FALL OF 50". THE BLOW COUNT IS TAKEN IN UNSTURPED SOIL IMMEDIATELY BELOW A CASED OR OPEN HOLE, ELIMINATING SIDE FRICTION ON THE DRIVE PIPE.

LEGEND OF PROBING

ELEV. STA. PROBING

7 AVERAGE BLOWS PER FT.

REFUSAL 95/6

95/6 = 95 BLOWS FOR 6" PENETRATION

PROBING TAKEN WITH A 350# WT. FALLING 18" ON A 2" O.D. POINT

LEGEND OF BORING

ELEV. STA. BORING

UNCONFINED STRENGTH BLOWS PER FT. USING 140# WT. FALLING 30"

WASH SAMPLE

SHELBY TUBE

GROUND WATER ELEVATION

NO GROUND WATER OBSERVED ABOVE THIS ELEVATION

DESCRIPTION OF MATERIAL

BOULDERS OR CUSPIDS

MATERIAL CHANGE

ALL UNCONFINED STRENGTH TAKEN WITH 1.5" HAND PENETROMETER

STATE HIGHWAY COMMISSION OF MISSISSIPPI

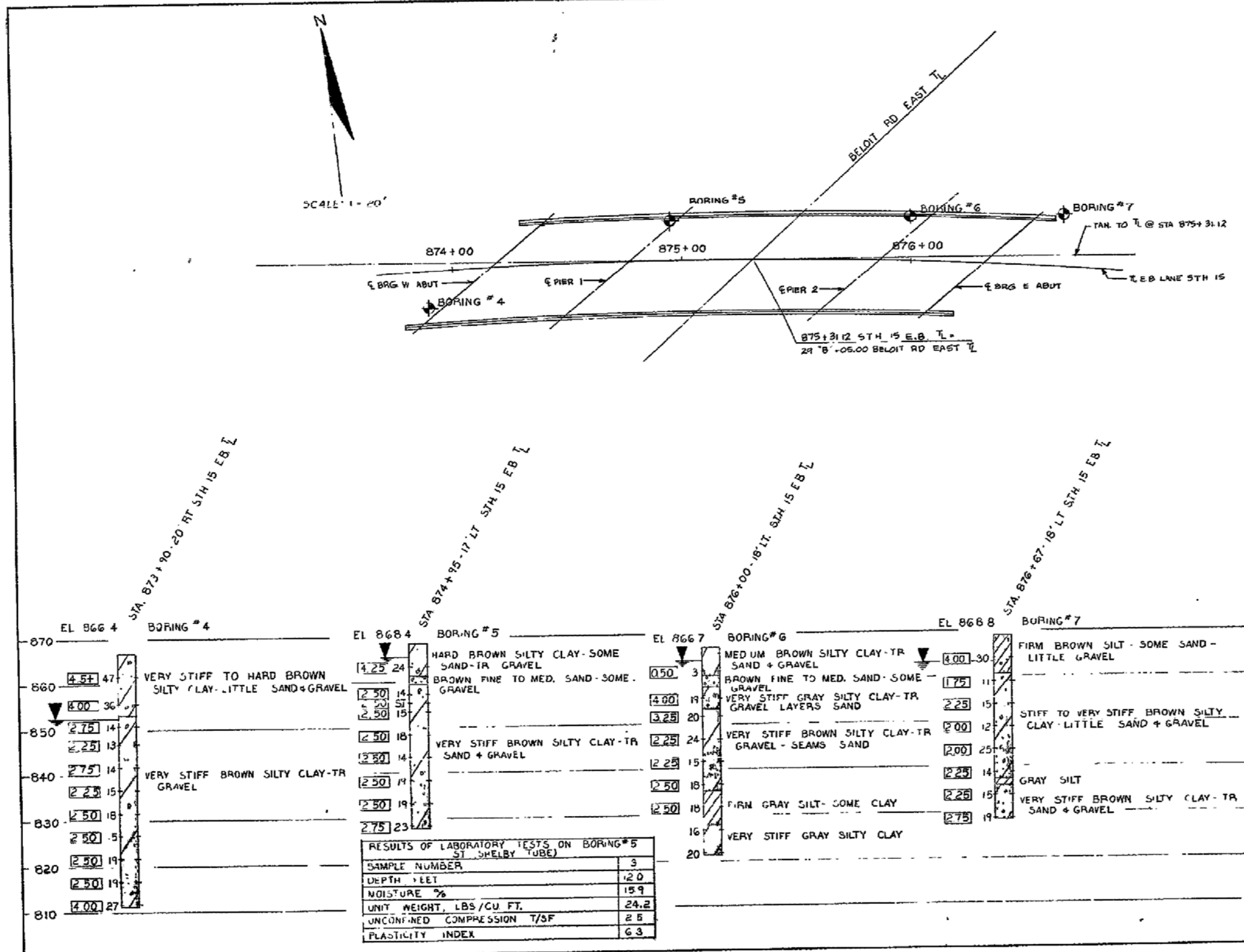
SUBSURFACE EXPLORATION

DESIGN BY: ARSNO 501 10/20/85 15.20 10/20/85

DATE: 7-7-87

STRUCTURE: B-67-134

SHEET: 16 OF 16



B-67-1

SCREENSCAN

30-MAR-1998 11:19

4	Feb 2 1998	119	272
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SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN

FOR THE DESIGN OF THE STRUCTURE FOUNDATION, TO OBTAIN RELATIVE DATA CONCERNING THE CHARACTER OF MATERIAL IN AND UPON WHICH THE FOUNDATION WOULD BE BUILT, BORINGS AND/OR SOUNDINGS WERE MADE AT POINTS APPROXIMATELY AS INDICATED ON THIS DRAWING WITH THE LOG OF SUCH EXPLORATION DATA AS INTERPRETED FOR SUCH DESIGN PURPOSE AS SHOWN THE EXPLORATIONS WERE MADE BY ORDINARY AND CONVENTIONAL METHODS AND ARE DEEMED ADEQUATE FOR SUCH PURPOSE. HOWEVER, SINCE IT IS A MATTER OF COMMON KNOWLEDGE THAT THE EXACT CHARACTER OF ANY MATERIAL AND ITS REACTION IS DIFFICULT TO DETERMINE FROM SUCH SUBSURFACE EXPLORATION AND THAT THE KIND AND CHARACTER OF MATERIAL AT THE SITE WHERE THE FOUNDATIONS ARE BUILT MAY VARY SUBSTANTIALLY FROM THAT INDICATED BY THE LOGS THEY ARE MADE AVAILABLE TO THE BIDDERS SIMPLY FOR WHAT THEY ARE WORTH, WITHOUT ANY WARRANTY, EXPRESSED OR IMPLIED THAT THE MATERIAL TO BE ENCOUNTERED IN BUILDING THE FOUNDATION WILL CONFORM THEREWITH IF THE LOG IS USED BY THE CONTRACTOR IN MAKING HIS BID, IT IS HEREBY EXPRESSLY STIPULATED THAT THE COMMISSION ACCEPTS NO RESPONSIBILITY FOR SUCH USE.

UNLESS OTHERWISE SPECIFIED THE BLOWS PER FOOT AT THE LOCATIONS INDICATED ARE BASED ON DRIVING A 2" O.D. x 1.5" I.D. SPLIT SPOON SAMPLER WITH A 140 LB. HAMMER HAVING A FREE FALL OF 30". THE BLOW COUNT IS TAKEN IN UNDISTURBED SOIL IMMEDIATELY BELOW A CASED OR OPEN HOLE ELIMINATING SIDE FRICTION ON THE DRIVE PIPE.

LEGEND OF PROBING

ELEV. STA. PROBE #

7 AVERAGE BLOWS PER FT.

REFUSAL 95/6

95/6 = 95 BLOWS FOR 6" PENETRATION PROBING TAKEN WITH A 350^{LB} WT. FALLING 18" ON A 2" O.D. POINT

LEGEND OF BORING

ELEV. STA. BORING #

UNCONFINED STRENGTH BLOWS PER FT. USING 140^{WT} FALLING 30"

WASH SAMPLE

SHELBY TUBE

GROUND WATER ELEVATION

NO GROUND WATER OBSERVED ABOVE THIS ELEVATION

DESCRIPTION OF MATERIAL

BOULDERS OR COBBLES

MATERIAL CHANGE

ALL UNCONFINED STRENGTH TAKEN WITH A HAND PENETROMETER

STATE HIGHWAY COMMISSION OF WISCONSIN

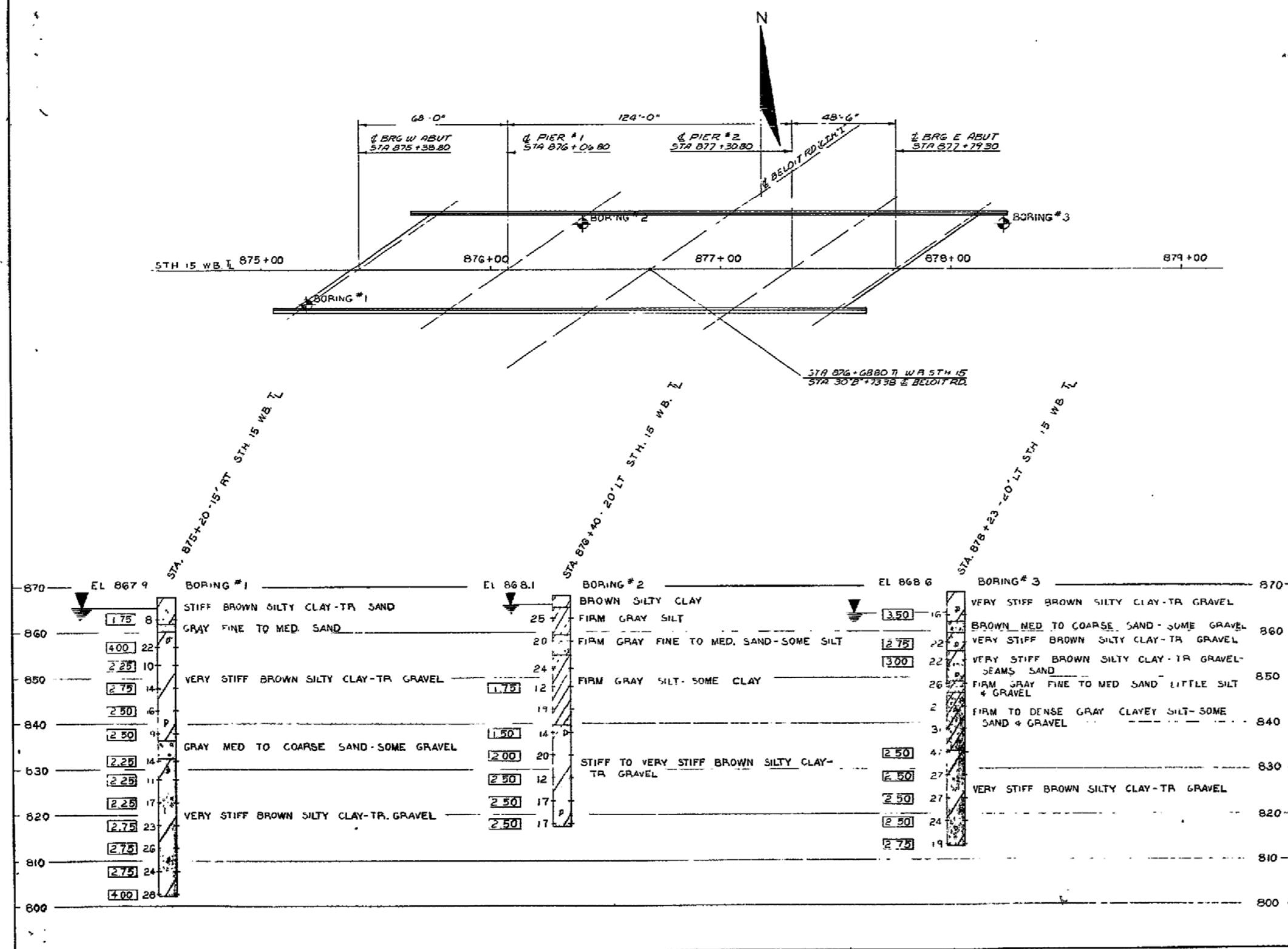
SUBSURFACE EXPLORATION

DESIGN AND A 1.5 H.D. (1) LOADING 15.00 CONF 1963

DATE 10-15-94 BY 10/15/94

STRUCTURE **B 67-135** SHEET 14 OF 14

X 36265



B-67

DESIGN DATA

LIVE LOAD:

DESIGN RATING; HS-25
INVENTORY RATING; HS-29
OPERATIONAL RATING; HS-66
MAXIMUM STANDARD PERMIT VEHICLE LOAD = 250 KIPS.

STRUCTURE IS DESIGNED FOR A FUTURE WEARING
SURFACE OF 20 POUNDS PER SQUARE FOOT.

ULTIMATE DESIGN STRESSES:

CONCRETE MASONRY SLAB — $f'_c = 4,000$ P.S.I. ALL OTHER — $f'_c = 3,500$ P.S.I.
BAR STEEL REINFORCEMENT, GRADE 60 — $f_y = 60,000$ P.S.I.
54W" PRESTRESSED GIRDERS, CONCRETE MASONRY — $f'_c = 8,000$ P.S.I.
STRANDS- 0.6" DIA. WITH ULTIMATE TENSILE STRENGTH OF 270,000 P.S.I.

FOUNDATION DATA

ABUTMENTS TO BE SUPPORTED ON HP 12 X 53 STEEL PILING
DRIVEN TO A MINIMUM BEARING VALUE OF 85 TONS PER PILE.
ESTIMATED 70'-0" LONG.

PIER TO BE SUPPORTED ON HP 10 X 42 STEEL PILING
DRIVEN TO A MINIMUM BEARING VALUE OF 55 TONS PER PILE.
ESTIMATED 50'-0" LONG.

TRAFFIC VOLUME


IH. 43	MOORLAND ROAD
A.D.T.=45,975 (2026)	A.D.T.=48,380 (2026)
R.D.S.=70 M.P.H.	R.D.S.=40 M.P.H.


LIST OF DRAWINGS

1. GENERAL PLAN
2. CROSS SECTION AND STAGE CONSTRUCTION
3. PROFILE GRADES, QUANTITIES AND GENERAL NOTES
4. SUBSURFACE EXPLORATION
5. WEST ABUTMENT
6. WEST ABUTMENT DETAILS
7. EAST ABUTMENT
8. EAST ABUTMENT DETAILS
9. PIER
10. PIER DETAILS
11. 54W" PRESTRESSED GIRDER DETAILS
12. 54W" PRESTRESSED GIRDER DETAILS
13. STEEL DIAPHRAGM
14. SUPERSTRUCTURE CROSS SECTION
15. SUPERSTRUCTURE
16. SUPERSTRUCTURE DETAILS
17. ABUTMENT DIAPHRAGMS
18. SLOPED FACE PARAPET 'HF' (NORTH SIDE)
19. SLOPED FACE PARAPET 'HF' (SOUTH SIDE)
20. FENCING DETAILS
21. ALTERNATE CONSTRUCTION JOINT

STRUCTURES DESIGN CONTACTS:
KENT BAHLER (608) 266-8490
VU THAO (608) 267-2869

NO.	DATE	REVISION	BY

	Plans Prepared By	WISDOT
	BUREAU OF STRUCTURES	

APPROVED  12-15-06
CHIEF STRUCTURAL DESIGN ENGINEER DATE

STRUCTURE B-67-293

SB. IH. 43 OVER MOORLAND ROAD

COUNTY	WAUKESHA	CITY	NEW BERLIN
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DESIGN SPEC.	AASHTO STD. SPEC. 2003	LOAD	HS-25	CONST. SPEC.	2003		
DESIGNED BY	VT	DESIGN CK'D.	SDR	DRAWN BY	CRJ	PLANS CK'D.	DDS

GENERAL PLAN

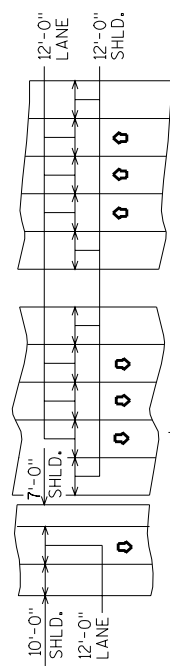
SHEET 1 OF 21

* PROVIDE FOR THREE BEAM
GUARD RAIL ATTACHMENT

* * APPROACH BARRIER

NAME PLATE & BENCH
MARK CAP-FOR LOCATION
SEE SHEET 18

TEMPORARY WIDENING FOR
STAGE 2 CONSTRUCTION



B-67-293

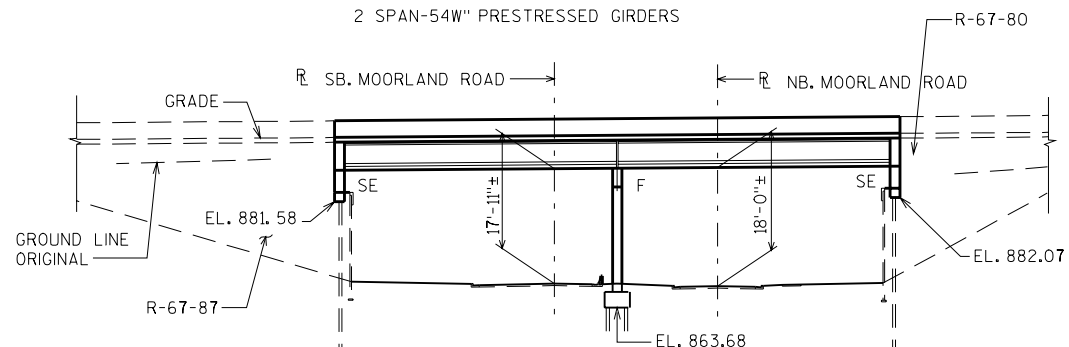
B-67-294

B-67-295

PLAN

2 SPAN-54W" PRESTRESSED GIRDERS

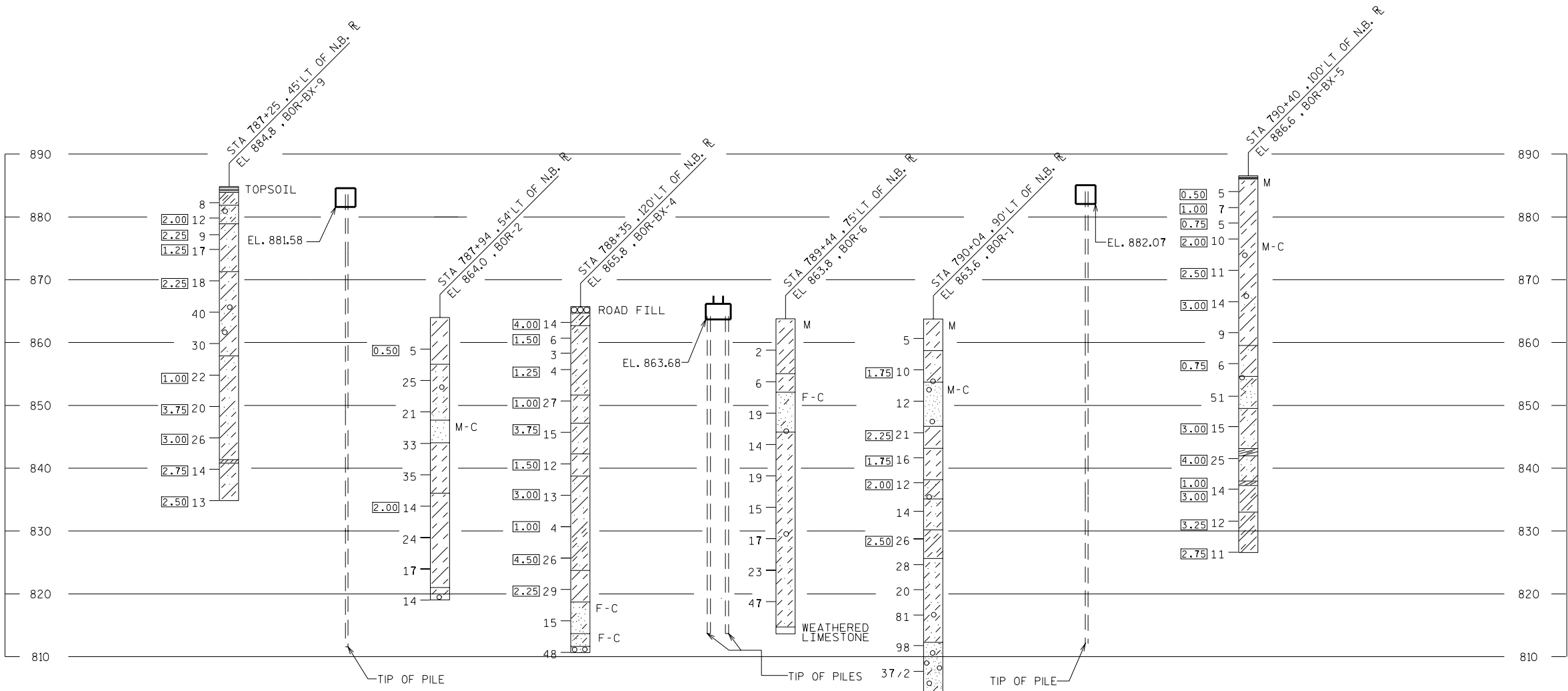
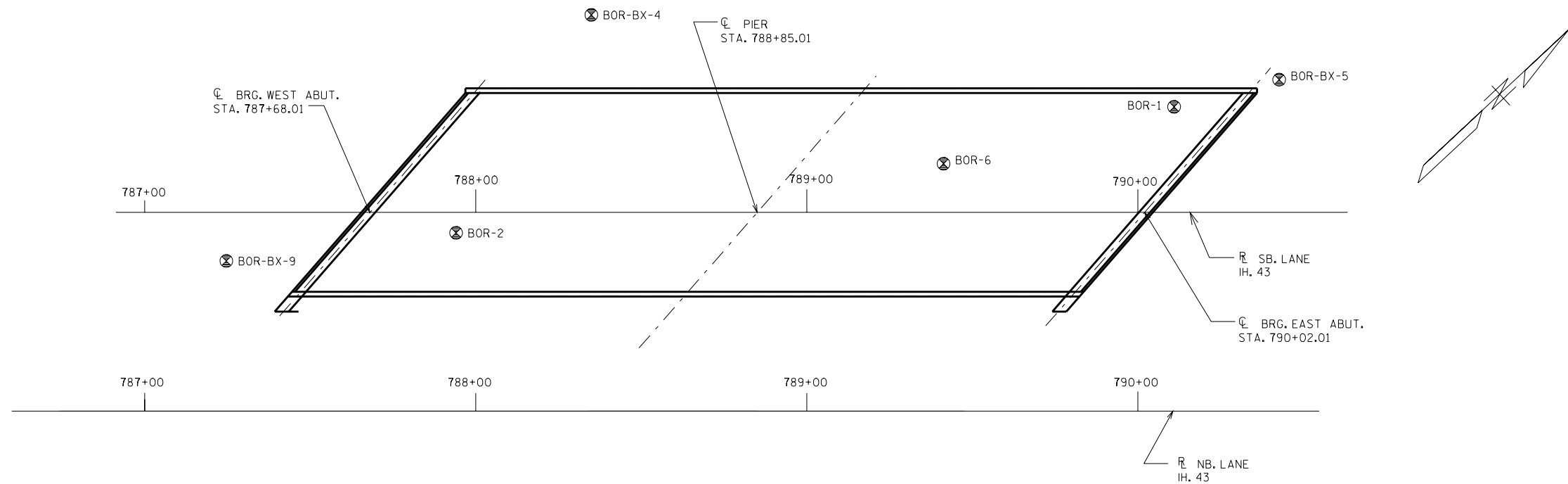
LIGHT STANDARD
@ STA. 788+60.00



TYPICAL SECTION THRU MOORLAND ROAD

A = 20'-0" UP TO STA. 30+42.14
21'-6 3/4" @ STA. 30+63.08
B = 26'-1 3/4" UP TO STA. 30+42.14
24'-7 1/8" @ STA. 30+63.08

I-43 OVER MOORLAND ROAD
MOORLAND ROAD, WAUKESHA COUNTY



STATE PROJECT NUMBER

1090-17-70

ABBREVIATIONS

F — FINE M — MEDIUM C — COARSE
WS — WEATHERED SO — SOUND

MATERIAL SYMBOLS

TOPSOIL SAND SILT SANDSTONE
SAND PEAT LIMESTONE
GRAVEL CLAY IGNEOUS ROCK

LEGEND OF PROBING

PROBING NO.
STA.
ELEVATION
7 AVERAGE BLOWS PER FOOT
REFUSAL 95/6

95/6=95 BLOWS FOR 6"
PENETRATION
PROBING TAKEN WITH
A 350# WT.
FALLING 18" ON A 2"
O.D. POINT.

LEGEND OF BORING

ELEV. BORING NO.
STA.

UNCONFINED STRENGTH → 7.7
BLOWS PER FT. USING 140# WT. FALLING 30"

WASH SAMPLE

SHELBY TUBE — S.T.

GROUND WATER ELEVATION

NO GROUND WATER OBSERVED ABOVE THIS ELEVATION

SANDY GRAVEL
F. BOULDERS OR COBBLES
SAND
SILTY CLAY
SO
LIMESTONE

UNLESS OTHERWISE SPECIFIED, THE BLOWS PER FOOT AT THE LOCATIONS INDICATED ARE BASED ON DRIVING A 2" O.D. X 1.4" I.D. SPLIT SPOON SAMPLER WITH A 140# HAMMER HAVING A FREE FALL OF 30". THE BLOW COUNT IS TAKEN IN UNDISTURBED SOIL IMMEDIATELY BELOW A CASED OR OPEN HOLE ELIMINATING SIDE FRICTION ON THE DRIVE PIPE.

SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN AND BIDDERS INFORMATION

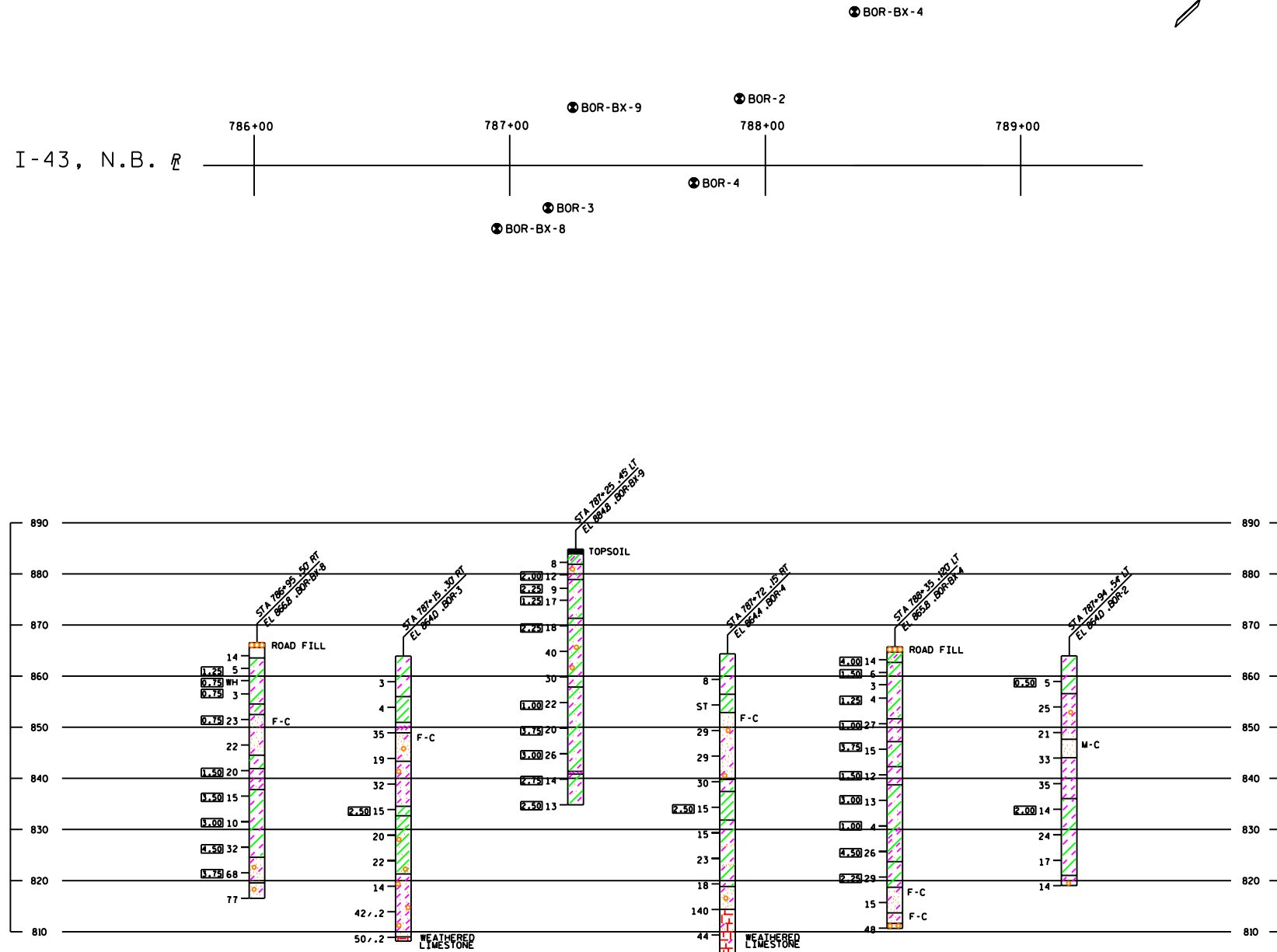
TO OBTAIN RELATIVE DATA CONCERNING THE CHARACTER OF MATERIAL IN AND UPON WHICH THE FOUNDATION MIGHT BE BUILT, BORINGS AND/OR SOUNDINGS WERE MADE AT POINTS APPROXIMATELY AS INDICATED ON THIS DRAWING. THE DATA PRESENTED HEREIN REPRESENTS THE FINDINGS OF THE SUBSURFACE EXPLORATIONS MADE. HOWEVER, BECAUSE THE DEPTHS INVESTIGATED ARE LIMITED AND THE AREA OF THE BORINGS AND/OR SOUNDINGS IS VERY SMALL IN RELATION TO THE ENTIRE AREA, THE WISCONSIN DEPARTMENT OF TRANSPORTATION DOES NOT WARRANT CONDITIONS BELOW THE DEPTHS INVESTIGATED OR THAT THE CLASSIFICATION OF MATERIAL ENCOUNTERED IN THESE INVESTIGATIONS IS NECESSARILY TYPICAL OF THE ENTIRE SITE.

NO.	DATE	REVISION	BY
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STRUCTURES DESIGN SECTION			
STRUCTURE B-67-293			
DRAWN BY CRJ		PLANS CK'D. DDS	
SUBSURFACE EXPLORATION		SHEET 4	

SCALE = 9.6

I-43 OVER MOORLAND ROAD
MOORLAND ROAD, WAUKESHA COUNTY

I-43, N.B. R



STATE PROJECT NUMBER

ABBREVIATIONS

F— FINE M— MEDIUM C— COARSE
WS— WEATHERED SO— SOUND

MATERIAL SYMBOLS

TOPSOIL SILT SANDSTONE
SAND PEAT LIMESTONE
GRAVEL CLAY IGNEOUS ROCK

LEGEND OF PROBING

PROBING NO.
STA.
ELEVATION
7 AVERAGE BLOWS PER FOOT
REFUSAL 95/6
95/6=95 BLOWS FOR 6"
PENETRATION
PROBING TAKEN WITH
A 350# WT.
FALLING 18" ON A 2"
O.D. POINT.

LEGEND OF BORING

ELEV. BORING NO.
STA.
UNCONFINED STRENGTH— 7.7
BLOWS PER FT. USING 140# WT. FALLING 30"
WASH SAMPLE
SHELBY TUBE— S.T.
GROUND WATER ELEVATION
NO GROUND WATER OBSERVED ABOVE THIS ELEVATION
SANDY GRAVEL
F. BOULDERS OR COBBLES
SAND
SILTY CLAY
SO LIMESTONE

UNLESS OTHERWISE SPECIFIED, THE BLOWS PER FOOT AT THE LOCATIONS INDICATED ARE BASED ON DRIVING A 2" O.D. X 14" I.D. SPLIT SPOON SAMPLER WITH A 140# HAMMER HAVING A FREE FALL OF 30". THE BLOW COUNT IS TAKEN IN UNDISTURBED SOIL IMMEDIATELY BELOW A CASED OR OPEN HOLE ELIMINATING SIDE FRICTION ON THE DRIVE PIPE.

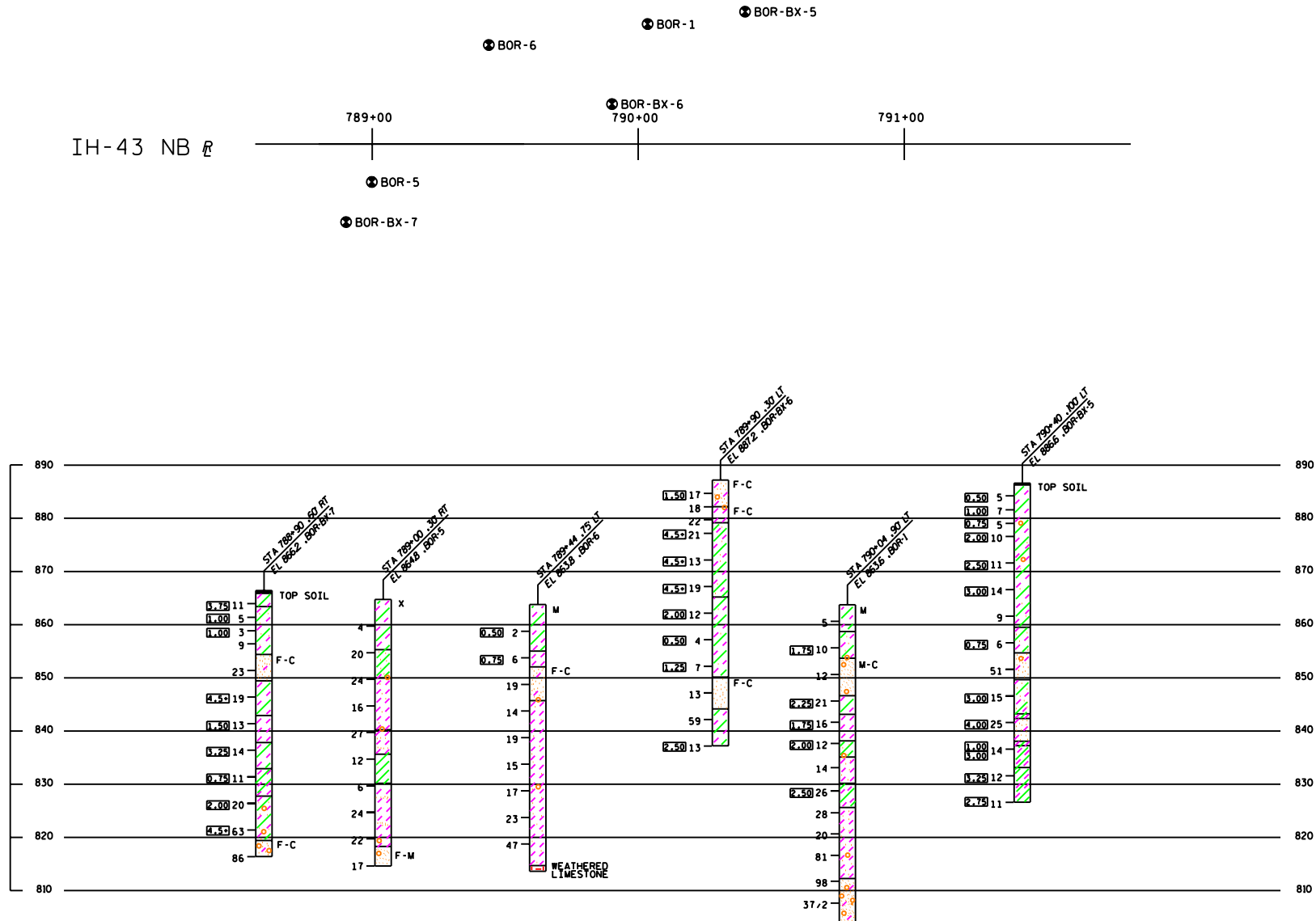
SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN AND BIDDERS INFORMATION

TO OBTAIN RELATIVE DATA CONCERNING THE CHARACTER OF MATERIAL IN AND UPON WHICH THE FOUNDATION MIGHT BE BUILT, BORINGS AND/OR SOUNDINGS WERE MADE AT POINTS APPROXIMATELY AS INDICATED ON THIS DRAWING. THE DATA PRESENTED HEREIN REPRESENTS THE FINDINGS OF THE SUBSURFACE EXPLORATIONS MADE. HOWEVER, BECAUSE THE DEPTHS INVESTIGATED ARE LIMITED AND THE AREA OF THE BORINGS AND/OR SOUNDINGS IS VERY SMALL IN RELATION TO THE ENTIRE AREA, THE WISCONSIN DEPARTMENT OF TRANSPORTATION DOES NOT WARRANT CONDITIONS BELOW THE DEPTHS INVESTIGATED OR THAT THE CLASSIFICATION OF MATERIAL ENCOUNTERED IN THESE INVESTIGATIONS IS NECESSARILY TYPICAL OF THE ENTIRE SITE.

NO.	DATE	REVISION	BY
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STRUCTURES DESIGN SECTION STRUCTURE 0-67-293			
DRAWN BY		BE	PLANS C.O.D.
SUBSURFACE EXPLORATION		SHEET 01	

I-43 OVER MOORLAND ROAD
MOORLAND ROAD-EAST COUNTY LINE, WAUKESHA COUNTY

IH-43 NB R



STATE PROJECT NUMBER

ABBREVIATIONS

F— FINE M— MEDIUM C— COARSE
WS— WEATHERED SO— SOUND

MATERIAL SYMBOLS

TOPSOIL SILT SANDSTONE
SAND PEAT LIMESTONE
GRAVEL CLAY IGNEOUS ROCK

LEGEND OF PROBING

PROBING NO.
STA.
ELEVATION
95/6=95 BLOWS FOR 6"
PENETRATION
PROBING TAKEN WITH
A 350# WT.
FALLING 18" ON A 2"
O.D. POINT.
7 AVERAGE BLOWS PER FOOT
REFUSAL 95/6

LEGEND OF BORING

ELEV. BORING NO.
STA.
UNCONFINED STRENGTH
BLOWS PER FT.
USING 140# WT.
FALLING 30"
WASH SAMPLE
SHELBY TUBE S.T.
GROUND WATER ELEVATION
NO GROUND WATER
OBSERVED ABOVE
THIS ELEVATION
SANDY GRAVEL
F. BOULDERS OR
COBBLES
SAND
SILTY CLAY
SO
LIMESTONE

UNLESS OTHERWISE SPECIFIED, THE BLOWS PER FOOT AT THE LOCATIONS INDICATED ARE BASED ON DRIVING A 2" O.D. X 1.4" I.D. SPLIT SPOON SAMPLER WITH A 140# HAMMER HAVING A FREE FALL OF 30". THE BLOW COUNT IS TAKEN IN UNDISTURBED SOIL IMMEDIATELY BELOW A Cased OR OPEN HOLE ELIMINATING SIDE FRICTION ON THE DRIVE PIPE.

SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN AND BIDDERS INFORMATION

TO OBTAIN RELATIVE DATA CONCERNING THE CHARACTER OF MATERIAL IN AND UPON WHICH THE FOUNDATION MIGHT BE BUILT, BORINGS AND/OR SOUNDINGS WERE MADE AT POINTS APPROXIMATELY AS INDICATED ON THIS DRAWING. THE DATA PRESENTED HEREIN REPRESENTS THE FINDINGS OF THE SUBSURFACE EXPLORATIONS MADE. HOWEVER, BECAUSE THE DEPTHS INVESTIGATED ARE LIMITED AND THE AREA OF THE BORINGS AND/OR SOUNDINGS IS VERY SMALL IN RELATION TO THE ENTIRE AREA, THE WISCONSIN DEPARTMENT OF TRANSPORTATION DOES NOT WARRANT CONDITIONS BELOW THE DEPTHS INVESTIGATED OR THAT THE CLASSIFICATION OF MATERIAL ENCOUNTERED IN THESE INVESTIGATIONS IS NECESSARILY TYPICAL OF THE ENTIRE SITE.

NO.	DATE	REVISION	BY
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STRUCTURES DESIGN SECTION STRUCTURE 0-67-294			
DRAWN BY		BE	PLANS C.D.
SUBSURFACE EXPLORATION			SHEET 01

LIVE LOAD:

DESIGN RATING; HS-25
INVENTORY RATING; HS-28
OPERATIONAL RATING; HS-65
MAXIMUM STANDARD PERMIT VEHICLE LOAD = 250 KIPS.

STRUCTURE IS DESIGNED FOR A FUTURE WEARING SURFACE OF 20 POUNDS PER SQUARE FOOT.

ULTIMATE DESIGN STRESSES:

CONCRETE MASONRY SLAB— $f'c = 4,000$ P.S.I. ALL OTHER— $f'c = 3,500$ P.S.I.
 BAR STEEL REINFORCEMENT, GRADE 60 $f_y = 60,000$ P.S.I.
 54W" PRESTRESSED GIRDERS, CONCRETE MASONRY— $f'c = 8,000$ P.S.I.
 STRANDS- 0.6" DIA. WITH ULTIMATE TENSILE STRENGTH OF 270,000 P.S.I.

ABUTMENTS TO BE SUPPORTED ON HP12X53 STEEL PILING
DRIVEN TO A MINIMUM BEARING VALUE OF 85 TONS PER PILE.
ESTIMATED 70'-0" LONG.

PIER TO BE SUPPORTED ON HP10X42 STEEL PILING
DRIVEN TO A MINIMUM BEARING VALUE OF 55 TONS PER PILE.
ESTIMATED 50'-0" LONG.

<u>NB. LOOP RAMP</u>	<u>MOORLAND ROAD</u>
A.D.T.=13,750 (2026)	A.D.T.=48,380 (2026)
R.D.S.=50 M.P.H.	R.D.S.=40 M.P.H.

1. GENERAL PLAN
2. CROSS SECTION AND STAGE CONSTRUCTION
3. PROFILE GRADES, QUANTITIES AND GENERAL NOTES
4. SUBSURFACE EXPLORATION
5. WEST ABUTMENT
6. WEST ABUTMENT DETAILS
7. EAST ABUTMENT
8. EAST ABUTMENT DETAILS
9. PIER
10. PIER DETAILS
11. 54W" PRESTRESSED GIRDER DETAILS
12. 54W" PRESTRESSED GIRDER DETAILS
13. STEEL DIAPHRAGM
14. SUPERSTRUCTURE CROSS SECTION
15. SUPERSTRUCTURE
16. SUPERSTRUCTURE DETAILS
17. LIGHTING DETAILS
18. SLOPED FACE PARAPET 'HF' MODIFIED (SOUTH SIDE)
19. SLOPED FACE PARAPET 'HF' (NORTH SIDE)
20. ALTERNATE CONSTRUCTION JOINT

STRUCTURES DESIGN CONTACTS:
KENT BAHLER (608) 266-8490
VU THAO (608) 267-2869

NO.	DATE	REVISION



Plans
Prepared By **WISDOT**
BUREAU OF STRUCTURES

APPROVED [REDACTED] 12-15-06
CHIEF STRUCTURAL DESIGN ENGINEER DATE

STRUCTURE B-67-295

NB. LOOP RAMP OVER MOORLAND ROAD

COUNTY	WAUKESHA	TOWN/CITY/VILLAGE	NEW BERLIN
--------	----------	------------------------------	------------

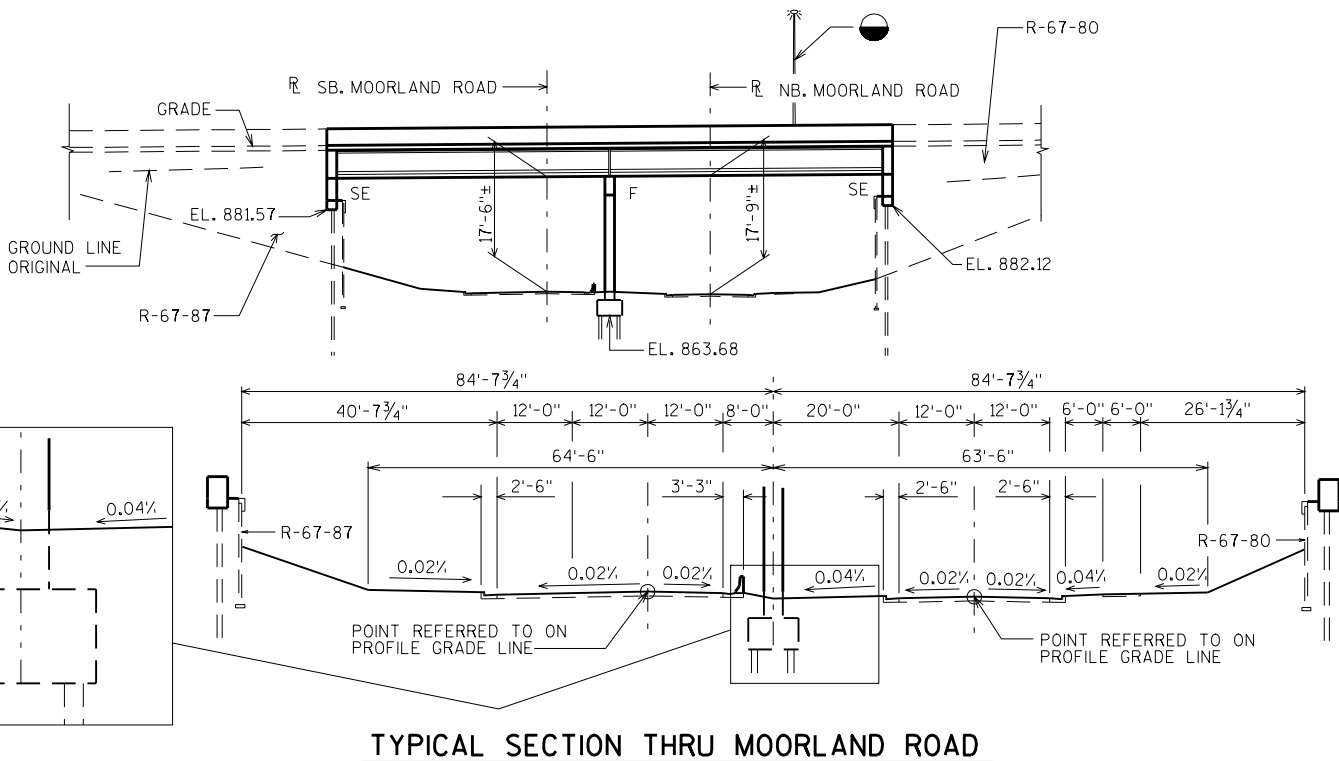
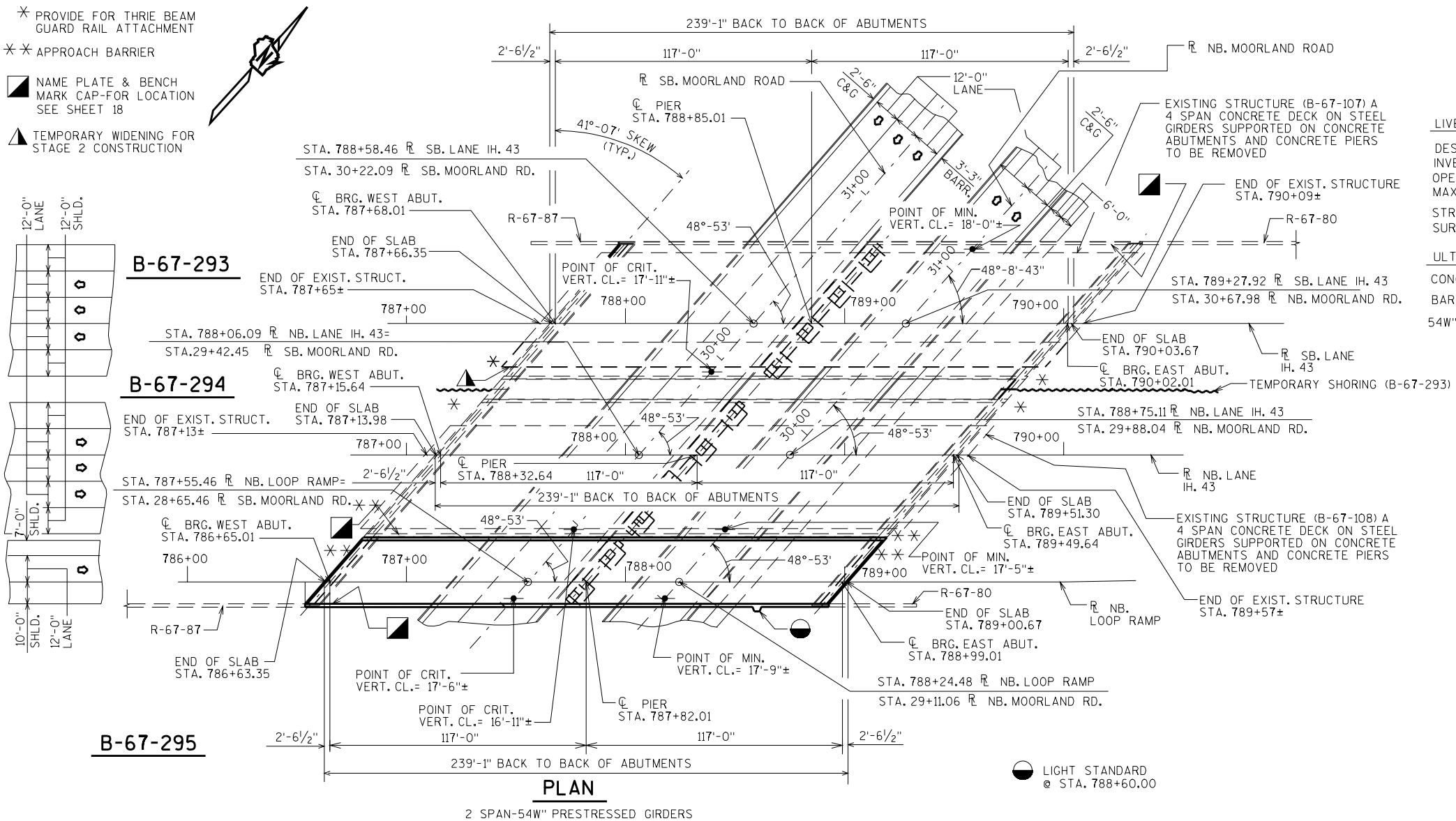
DESIGN SPEC. AASHTO STD. SPEC. 2003		LOAD HS-25	CONST. SPEC. 2003
DESIGNED BY VT	DESIGN CK'D. SDR	DRAWN BY CRJ	PLANS CK'D. DDS

GENERAL PLAN

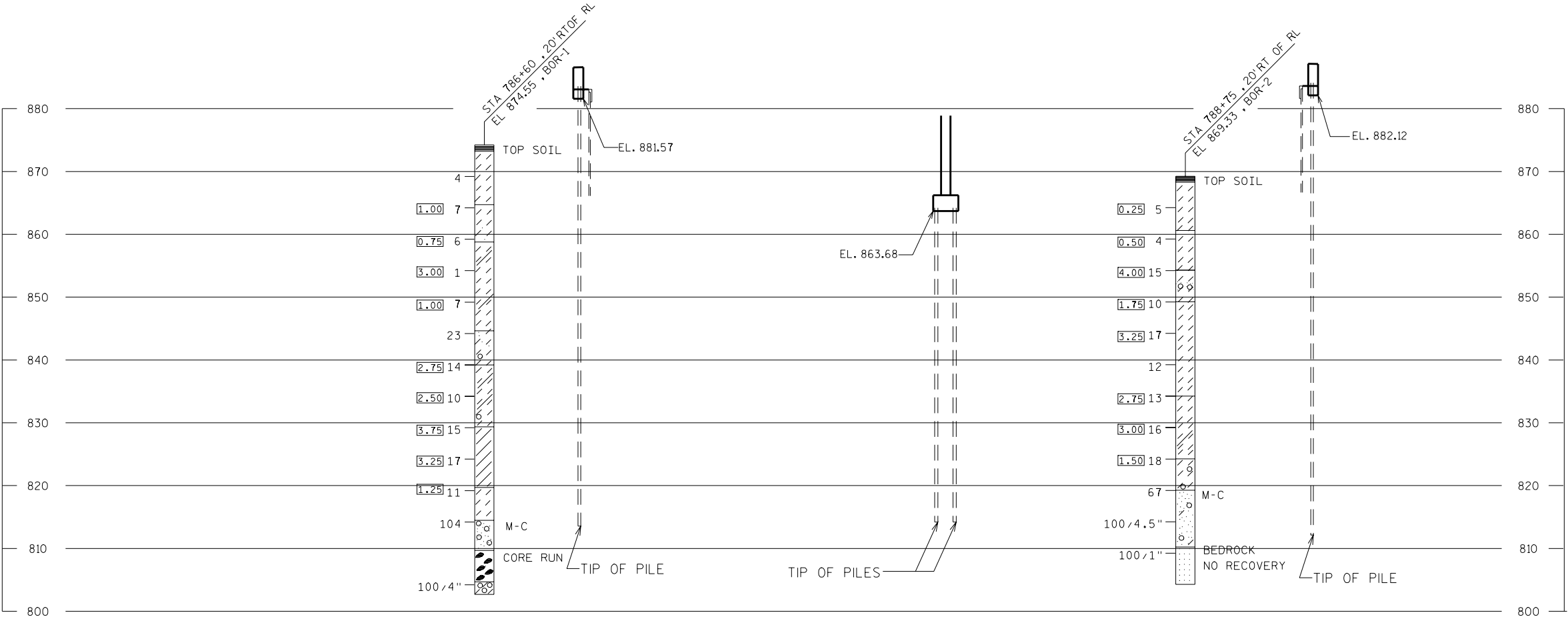
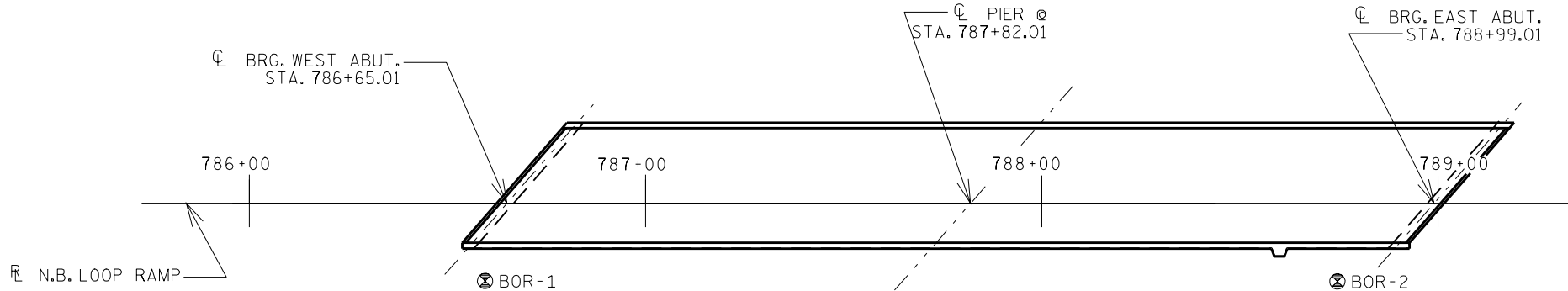
SHEET 1 OF 20

I.D. 1090-17-01CC

ATE: JULY '06



IH-43 RAMP OVER MOORLAND ROAD
MOORLAND ROAD , WAUKESHA COUNTY



STATE PROJECT NUMBER

1090-17-70

ABBREVIATIONS

F — FINE M — MEDIUM C — COARSE
WS — WEATHERED SO — SOUND

MATERIAL SYMBOLS

TOPSOIL	SILT	SANDSTONE
SAND	PEAT	LIMESTONE
GRAVEL	CLAY	IGNEOUS ROCK

LEGEND OF PROBING

PROBING NO.
STA.
ELEVATION
95/6=95 BLOWS FOR 6"
PENETRATION
PROBING TAKEN WITH
A 350# WT.
FALLING 18" ON A 2"
O.D. POINT.
7 AVERAGE BLOWS PER FOOT
REFUSAL 95/6

LEGEND OF BORING

ELEV. BORING NO.
STA.
UNCONFINED STRENGTH → 7.7
BLOWS PER FT. USING 140# WT. FALLING 30"
WASH SAMPLE
SHELBY TUBE — S.T.
GROUND WATER ELEVATION
NO GROUND WATER OBSERVED ABOVE THIS ELEVATION
SANDY GRAVEL
F. BOULDERS OR COBBLES
SAND
SILTY CLAY
SO
LIMESTONE

UNLESS OTHERWISE SPECIFIED, THE BLOWS PER FOOT AT THE LOCATIONS INDICATED ARE BASED ON DRIVING A 2" O.D. X 1.4" I.D. SPLIT SPOON SAMPLER WITH A 140# HAMMER HAVING A FREE FALL OF 30". THE BLOW COUNT IS TAKEN IN UNDISTURBED SOIL IMMEDIATELY BELOW A CASED OR OPEN HOLE ELIMINATING SIDE FRICTION ON THE DRIVE PIPE.

SUBSURFACE EXPLORATION FOR FOUNDATION
DESIGN AND BIDDERS INFORMATION

TO OBTAIN RELATIVE DATA CONCERNING THE CHARACTER OF MATERIAL IN AND UPON WHICH THE FOUNDATION MIGHT BE BUILT, BORINGS AND/OR SOUNDINGS WERE MADE AT POINTS APPROXIMATELY AS INDICATED ON THIS DRAWING. THE DATA PRESENTED HEREIN REPRESENTS THE FINDINGS OF THE SUBSURFACE EXPLORATIONS MADE. HOWEVER, BECAUSE THE DEPTHS INVESTIGATED ARE LIMITED AND THE AREA OF THE BORINGS AND/OR SOUNDINGS IS VERY SMALL IN RELATION TO THE ENTIRE AREA, THE WISCONSIN DEPARTMENT OF TRANSPORTATION DOES NOT WARRANT CONDITIONS BELOW THE DEPTHS INVESTIGATED OR THAT THE CLASSIFICATION OF MATERIAL ENCOUNTERED IN THESE INVESTIGATIONS IS NECESSARILY TYPICAL OF THE ENTIRE SITE.

NO.	DATE	REVISION	BY
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STRUCTURES DESIGN SECTION			
STRUCTURE B-67-295			
DRAWN BY CRJ		PLANS CK'D. DDS	
SUBSURFACE EXPLORATION		SHEET 4	

SCALE = 12

DESIGN DATA

LIVE LOAD:

DESIGN RATING; HS-20
INVENTORY RATING; HS-29
OPERATIONAL RATING; HS-75
MAXIMUM STANDARD PERMIT VEHICLE LOAD = 250 KIPS.

STRUCTURE IS DESIGNED FOR A FUTURE WEARING
SURFACE OF 20 POUNDS PER SQUARE FOOT.

ULTIMATE DESIGN STRESSES:

CONCRETE MASONRY SLAB — f'_c = 4,000 P.S.I. ALL OTHER — f'_c = 3,500 P.S.I.
BAR STEEL REINFORCEMENT, GRADE 60 — f_y = 60,000 P.S.I.
54W" PRESTRESSED GIRDERS, CONCRETE MASONRY — f'_c = 9,000 P.S.I.
STRANDS — 0.6" DIA. WITH ULTIMATE TENSILE STRENGTH OF 270,000 P.S.I.

FOUNDATION DATA

ABUTMENTS TO BE SUPPORTED ON HP 10X42 STEEL PILING
DRIVEN TO A MINIMUM BEARING VALUE OF 55 TONS PER PILE.
ESTIMATED 60'-0" LONG (WEST ABUT. - PILES 1 THRU 119)
ESTIMATED 70'-0" LONG (WEST ABUT. - PILES 120 THRU 127)
ESTIMATED 55'-0" LONG (EAST ABUT. - PILES 1 THRU 119)
ESTIMATED 65'-0" LONG (EAST ABUT. - PILES 120 THRU 129)

CURVE DATA

IH. 43 NORTHBOUND

P.I. = STA. 822+63.04
 Δ = 40°-23'-30"
D = 1°-15'-00"
T = 1686.08'
L = 3231.33'
R = 4583.66'
S.E. = 0.04%
P.C. = STA. 805+76.96
P.T. = STA. 838+08.29

BELOIT ROAD

P.I. = STA. 22+80.80
 Δ = 11°-45'-31"
D = 1°-00'-00"
T = 590.00'
L = 1175.86'
R = 5729.58'
S.E. = NC
P.C. = STA. 16+90.80
P.T. = STA. 28+66.66

TRAFFIC VOLUME

IH. 43

A.D.T.=44,365 (2026)
R.D.S.=70 M.P.H.

BELOIT ROAD

A.D.T.=13,425 (2026)
R.D.S.=40 M.P.H.

PLAN

SINGLE SPAN-54W" PRESTRESSED GIRDERS

ELEVATION

NORMAL TO BELOIT ROAD

TYPICAL SECTION THRU BELOIT ROAD

LIST OF DRAWINGS

1. GENERAL PLAN
2. CROSS SECTION & STAGE CONSTRUCTION
3. PROFILE GRADES, QUANTITIES AND GENERAL NOTES
4. SUBSURFACE EXPLORATION
5. WEST ABUTMENT FOOTING DETAILS
6. WEST ABUTMENT
7. WEST ABUTMENT DETAILS
8. EAST ABUTMENT FOOTING DETAILS
9. EAST ABUTMENT
10. EAST ABUTMENT DETAILS
11. 54W PRESTRESSED GIRDER DETAILS
12. 54W PRESTRESSED GIRDER DETAILS
13. STEEL DIAPHRAGM
14. SUPERSTRUCTURE CROSS SECTION
15. SUPERSTRUCTURE
16. SUPERSTRUCTURE DETAILS
17. SLOPED FACED PARAPET TYPE 'HF'(SOUTH SIDE)
18. ALTERNATIVE CONSTRUCTION JOINT
19. SLOPED FACED PARAPET TYPE 'HF'(NORTH SIDE)

STRUCTURE DESIGN CONTACT:
KENT BAHLER (608) 266-8490
CHARLES JUDD (608) 266-4547

NO.	DATE	REVISION	BY

Plans Prepared By WISDOT	
BUREAU OF STRUCTURES	
APPROVED	12-15-06
CHIEF STRUCTURAL DESIGN ENGINEER DATE	
STRUCTURE B-67-296	
NORTHBOUND IH. 43 OVER BELOIT ROAD	
COUNTY	WAUKESHA
CITY	NEW BERLIN
DESIGN SPEC.	AASHTO STD. SPEC. 2003
LOAD	HS-20
CONST. SPEC.	2003
DESIGNED BY	SDR
DESIGN CK'D.	VT
DRAWN BY	DDS
PLANS CK'D.	SDR
GENERAL PLAN	
SHEET 1 OF 19	

STATE PROJECT NUMBER

1090-17-70

ABBREVIATIONS

F — FINE M — MEDIUM C — COARSE
WS — WEATHERED SO — SOUND

MATERIAL SYMBOLS

TOPSOIL SAND GRAVEL

SILT PEAT CLAY

SANDSTONE LIMESTONE IGNEOUS ROCK

LEGEND OF PROBING

PROBING NO. STA. ELEVATION 7 AVERAGE BLOWS PER FOOT REFUSAL 95/6

95/6=95 BLOWS FOR 6" PENETRATION PROBING TAKEN WITH A 350# WT. FALLING 18" ON A 2" O.D. POINT.

LEGEND OF BORING

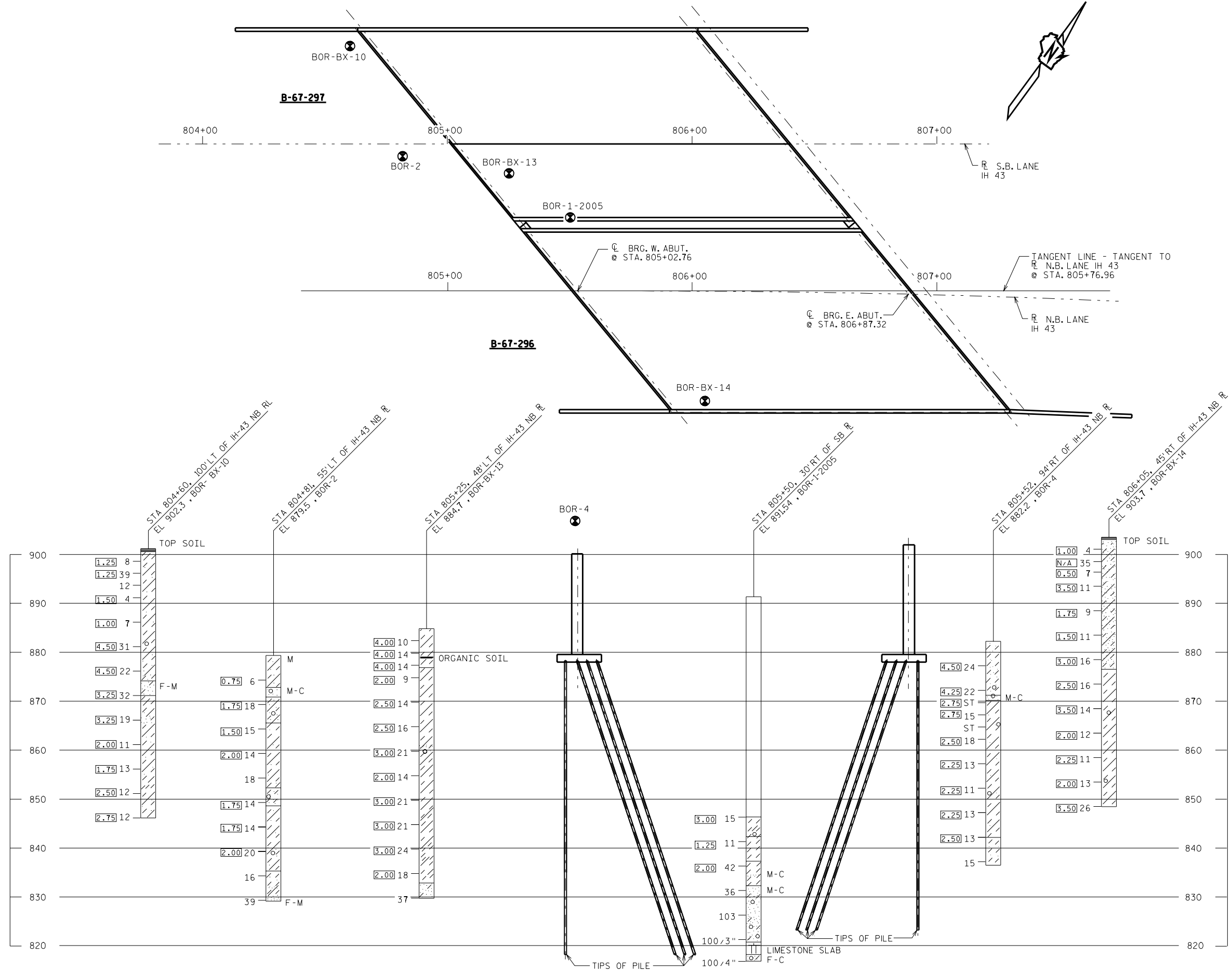
ELEV. BORING NO. STA. SANDY GRAVEL F. BOULDERS OR COBBLES SAND SILTY CLAY SO LIMESTONE

UNCONFINED STRENGTH 7.7 BLOWS PER FT. USING 140# WT. FALLING 30" WASH SAMPLE SHELBY TUBE — S.T. GROUND WATER ELEVATION NO GROUND WATER OBSERVED ABOVE THIS ELEVATION

UNLESS OTHERWISE SPECIFIED, THE BLOWS PER FOOT AT THE LOCATIONS INDICATED ARE BASED ON DRIVING A 2" O.D. X 1.4" I.D. SPLIT SPOON SAMPLER WITH A 140# HAMMER HAVING A FREE FALL OF 30". THE BLOW COUNT IS TAKEN IN UNDISTURBED SOIL IMMEDIATELY BELOW A CASED OR OPEN HOLE ELIMINATING SIDE FRICTION ON THE DRIVE PIPE.

SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN AND BIDDERS INFORMATION

TO OBTAIN RELATIVE DATA CONCERNING THE CHARACTER OF MATERIAL IN AND UPON WHICH THE FOUNDATION MIGHT BE BUILT, BORINGS AND/OR SOUNDINGS WERE MADE AT POINTS APPROXIMATELY AS INDICATED ON THIS DRAWING. THE DATA PRESENTED HEREIN REPRESENTS THE FINDINGS OF THE SUBSURFACE EXPLORATIONS MADE. HOWEVER, BECAUSE THE DEPTHS INVESTIGATED ARE LIMITED AND THE AREA OF THE BORINGS AND/OR SOUNDINGS IS VERY SMALL IN RELATION TO THE ENTIRE AREA, THE WISCONSIN DEPARTMENT OF TRANSPORTATION DOES NOT WARRANT CONDITIONS BELOW THE DEPTHS INVESTIGATED OR THAT THE CLASSIFICATION OF MATERIAL ENCOUNTERED IN THESE INVESTIGATIONS IS NECESSARILY TYPICAL OF THE ENTIRE SITE.



NO.	DATE	REVISION	BY
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STRUCTURES DESIGN SECTION			
STRUCTURE		B-67-296	
DRAWN BY		DDS	PLANS CK'D. SDR
SUBSURFACE EXPLORATION		SHEET 4	

DESIGN DATA

LIVE LOAD:
DESIGN RATING; HS-20
INVENTORY RATING; HS-29
OPERATIONAL RATING; HS-77
MAXIMUM STANDARD PERMIT VEHICLE LOAD = 250 KIPS.
STRUCTURE IS DESIGNED FOR A FUTURE WEARING SURFACE OF 20 POUNDS PER SQUARE FOOT.

ULTIMATE DESIGN STRESSES:
CONCRETE MASONRY SLAB — f'_c = 4,000 P.S.I. ALL OTHER — f'_c = 3,500 P.S.I.
BAR STEEL REINFORCEMENT, GRADE 60 — f_y = 60,000 P.S.I.
54W" PRESTRESSED GIRDERS, CONCRETE MASONRY — f'_c = 9000 P.S.I.
STRANDS- 0.6 DIA. WITH ULTIMATE TENSILE STRENGTH OF 270,000 P.S.I.

FOUNDATION DATA

ABUTMENTS TO BE SUPPORTED ON HP 10X42 STEEL PILING DRIVEN TO A MINIMUM BEARING VALUE OF 55 TONS PER PILE.
ESTIMATED 60'-0" LONG (WEST ABUT. - PILES 1 THRU 122).
ESTIMATED 70'-0" LONG (WEST ABUT. - PILES 123 THRU 132).
ESTIMATED 55'-0" LONG (EAST ABUT. - PILES 1 THRU 124).
ESITMATED 65'-0" LONG (EAST ABUT. - PILES 125 THRU 132).

CURVE DATA

IH. 43 NORTHBOUND	BELOIT ROAD
P.I. = STA. 822+63.04	P.I. = STA. 22+80.80
Δ = 40°-23'-30"	Δ = 11°-45'-31"
D = 1°-15'-00"	D = 1°-00'-00"
T = 1686.08'	T = 590.00'
L = 3231.33'	L = 1175.86'
R = 4583.66'	R = 5729.58'
S.E. = 0.04%	S.E. = NC
P.C. = STA. 805+76.96	P.C. = STA. 16+90.80
P.T. = STA. 838+08.29	P.T. = STA. 28+66.66


TRAFFIC VOLUME

IH. 43	BELOIT ROAD
A.D.T.=44,365 (2026)	A.D.T.=13,425 (2026)
R.D.S.=70 M.P.H.	R.D.S.=40 M.P.H.

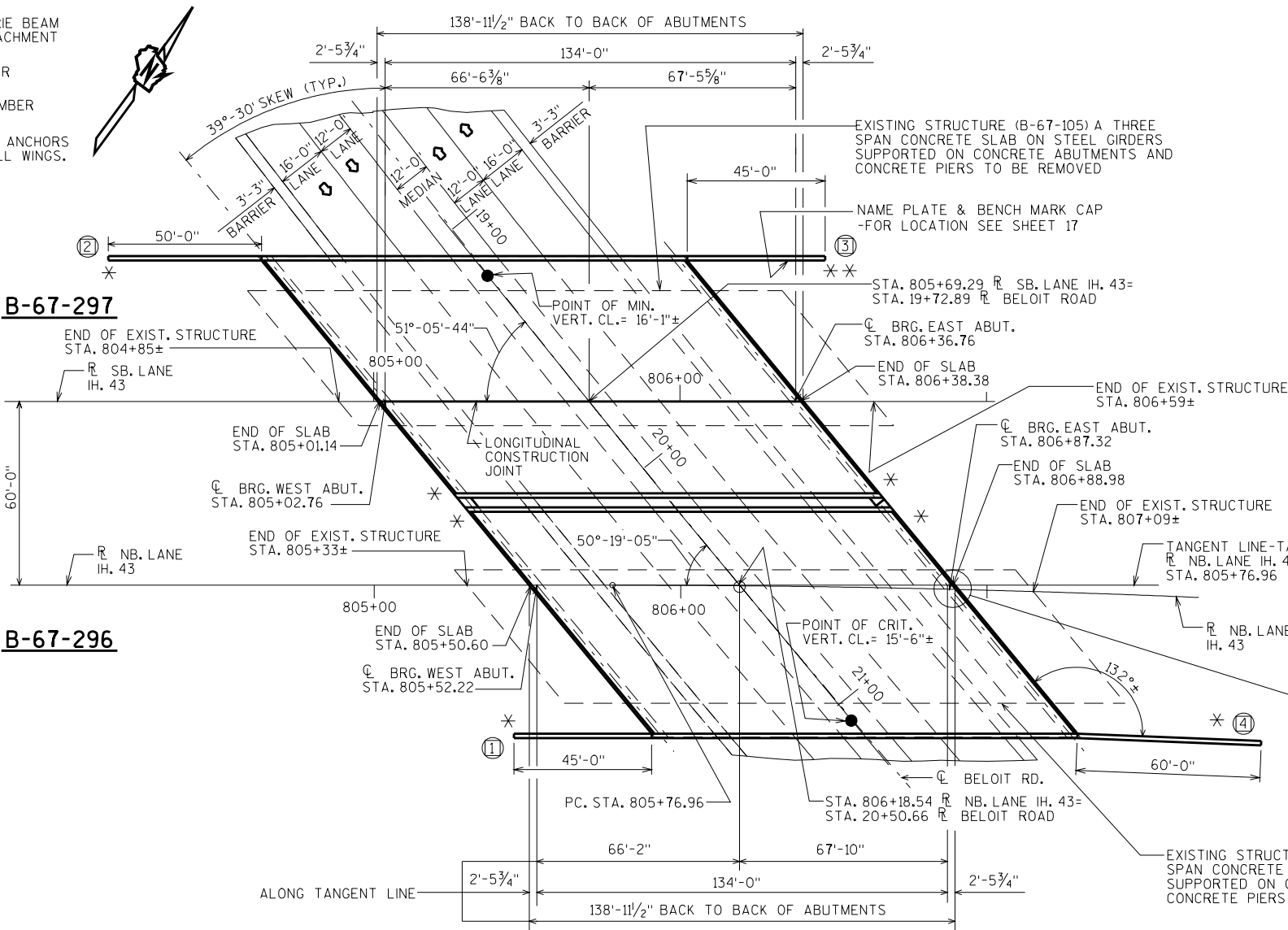
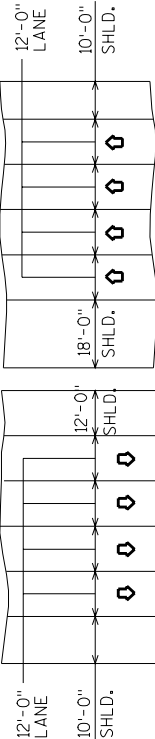
LIST OF DRAWINGS

1. GENERAL PLAN
2. CROSS SECTION & STAGE CONSTRUCTION
3. PROFILE GRADES, QUANTITIES AND GENERAL NOTES
4. SUBSURFACE EXPLORATION
5. WEST ABUTMENT FOOTING DETAILS
6. WEST ABUTMENT
7. WEST ABUTMENT DETAILS
8. EAST ABUTMENT FOOTING DETAILS
9. EAST ABUTMENT
10. EAST ABUTMENT DETAILS
11. 54W" PRESTRESSED GIRDER DETAILS
12. 54W" PRESTRESSED GIRDER DETAILS
13. STEEL DIAPHRAGM
14. SUPERSTRUCTURE CROSS SECTION
15. SUPERSTRUCTURE
16. SUPERSTRUCTURE DETAILS
17. SLOPED FACED PARAPET TYPE 'HF'(WING 2)
18. SLOPED FACED PARAPET TYPE 'HF'(WING 3)
19. ALTERNATIVE CONSTRUCTION JOINT
20. SLOPED FACED PARAPET TYPE 'HF'(SOUTH SIDE)

STRUCTURES DESIGN CONTACT:
KENT BAHLER (608) 266-8490
CHARLES JUDD (608) 266-4547

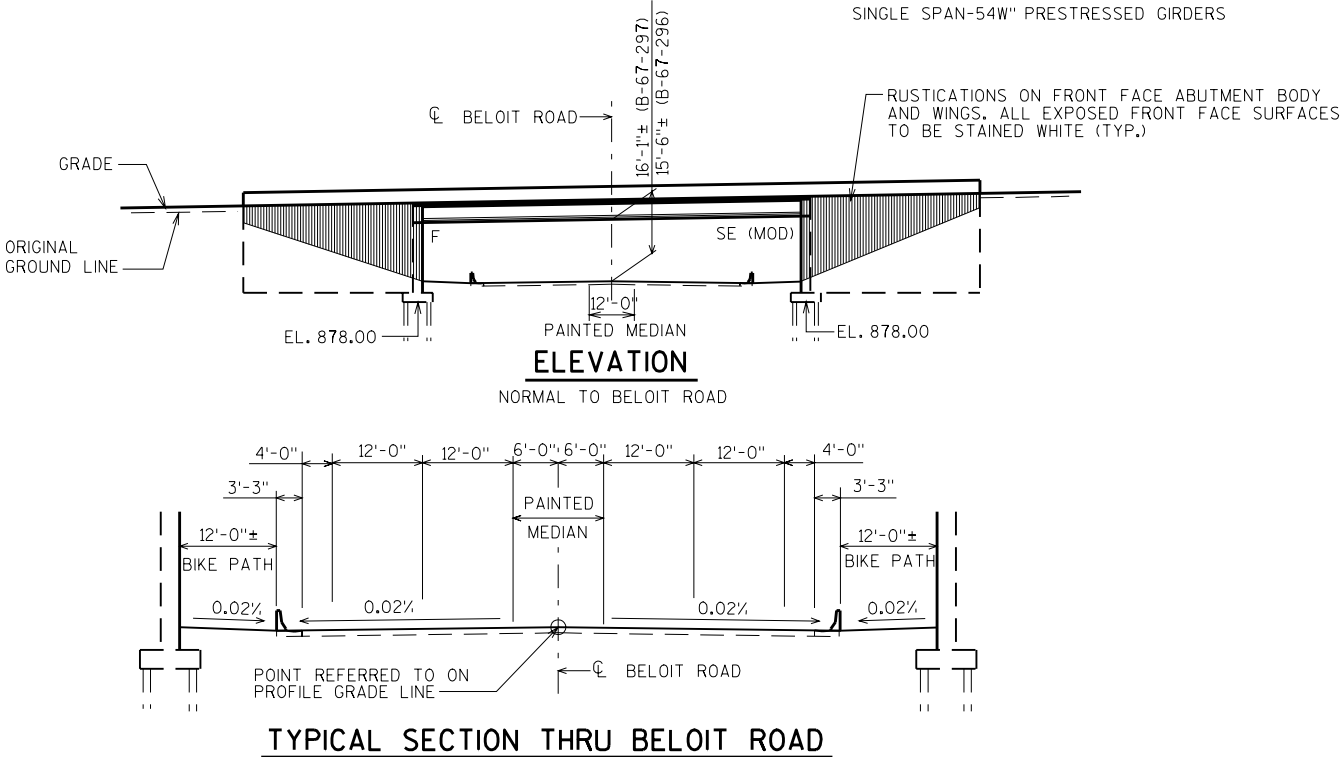
NO.	DATE	REVISION	BY
 Plans Prepared By WISDOT BUREAU OF STRUCTURES			
APPROVED		12-15-06	
CHIEF STRUCTURAL DESIGN ENGINEER DATE			
STRUCTURE B-67-297			
SOUTHBOUND IH. 43 OVER BELOIT ROAD			
COUNTY	WAUKESHA	CITY	NEW BERLIN
DESIGN SPEC.	AASHTO STD. SPEC. 2003	LOAD	HS-20
DESIGNED BY	SDR	CONST. SPEC.	2003
DRWN	CK'D.	PLANS	CRJ
VT	DD	CK'D.	
GENERAL PLAN			SHEET 1 OF 20

* PROVIDE FOR THRE BEAM GUARD RAIL ATTACHMENT
** APPROACH BARRIER
⊖ INDICATES WING NUMBER
NOTE: SURFACE DRAIN ANCHORS REQUIRED ON ALL WINGS.



PLAN

SINGLE SPAN-54W" PRESTRESSED GIRDERS



ELEVATION

NORMAL TO BELOIT ROAD

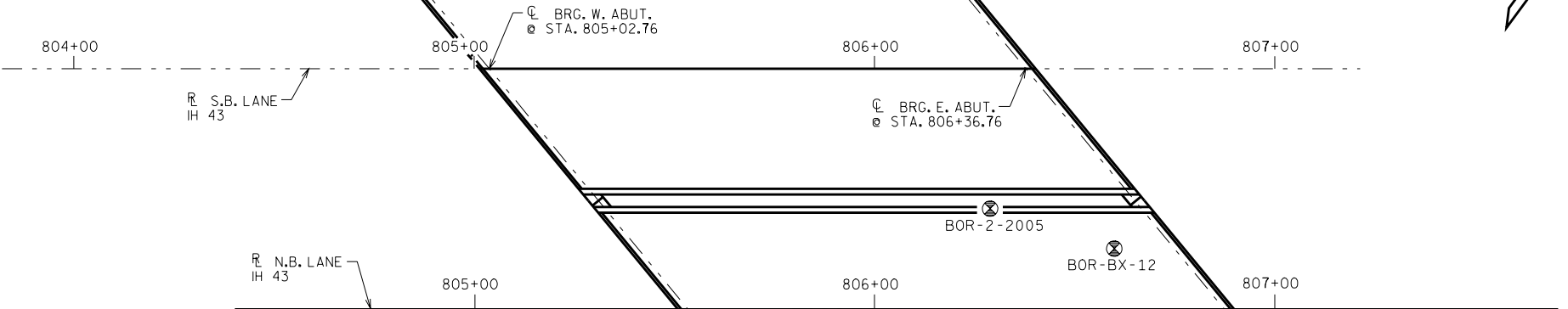
TYPICAL SECTION THRU BELOIT ROAD

IH-43 OVER BELOIT ROAD
MOORLAND ROAD-EAST COUNTY LINE, WAUKESHA COUNTY

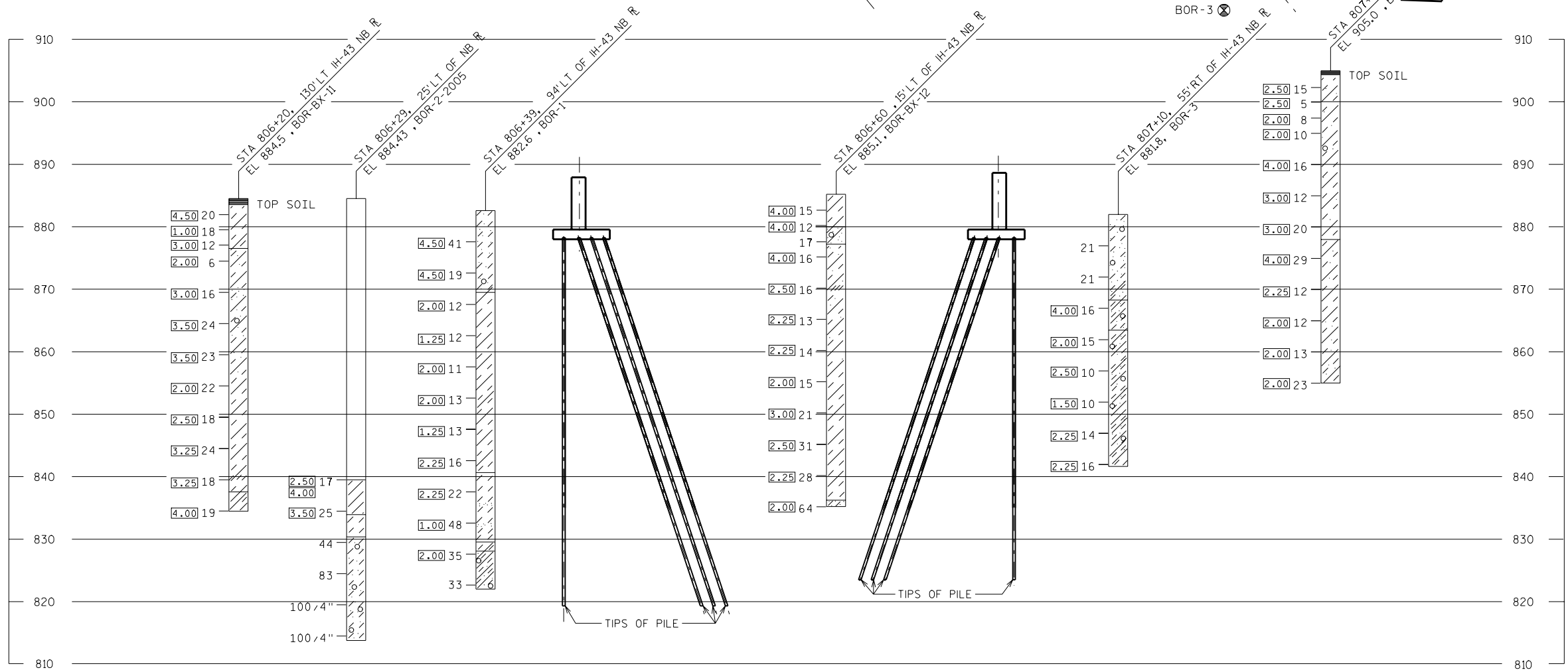
BOR-BX-11

BOR-1

B-67-297



B-67-296



STATE PROJECT NUMBER

1090-17-70

ABBREVIATIONS

F — FINE M — MEDIUM C — COARSE
WS — WEATHERED SO — SOUND

MATERIAL SYMBOLS

TOPSOIL SILT SANDSTONE
SAND PEAT LIMESTONE
GRAVEL CLAY IGNEOUS ROCK

LEGEND OF PROBING

PROBING NO.
STA.
ELEVATION
7 AVERAGE BLOWS PER FOOT
REFUSAL 95/6
95/6=95 BLOWS FOR 6" PENETRATION
PROBING TAKEN WITH A 350# WT. FALLING 18" ON A 2" O.D. POINT.

LEGEND OF BORING

ELEV. BORING NO. STA.
UNCONFINED STRENGTH 7.7
BLOWS PER FT. USING 140# WT. FALLING 30"
WASH SAMPLE
SHELBY TUBE — S.T.
GROUND WATER ELEVATION
NO GROUND WATER OBSERVED ABOVE THIS ELEVATION
SANDY GRAVEL
F. BOULDERS OR COBBLES
SAND
SILTY CLAY
SO
LIMESTONE

UNLESS OTHERWISE SPECIFIED, THE BLOWS PER FOOT AT THE LOCATIONS INDICATED ARE BASED ON DRIVING A 2" O.D. X 1.4" I.D. SPLIT SPOON SAMPLER WITH A 140# HAMMER HAVING A FREE FALL OF 30". THE BLOW COUNT IS TAKEN IN UNDISTURBED SOIL IMMEDIATELY BELOW A CASED OR OPEN HOLE ELIMINATING SIDE FRICTION ON THE DRIVE PIPE.

SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN AND BIDDERS INFORMATION

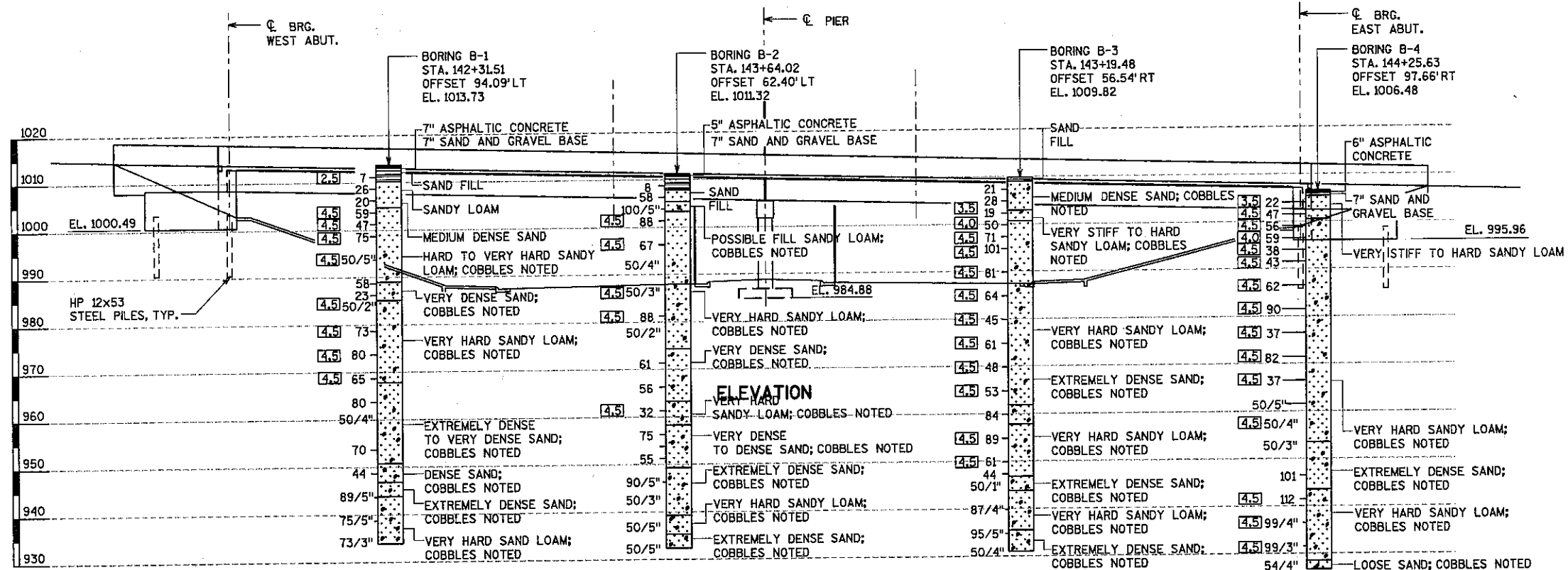
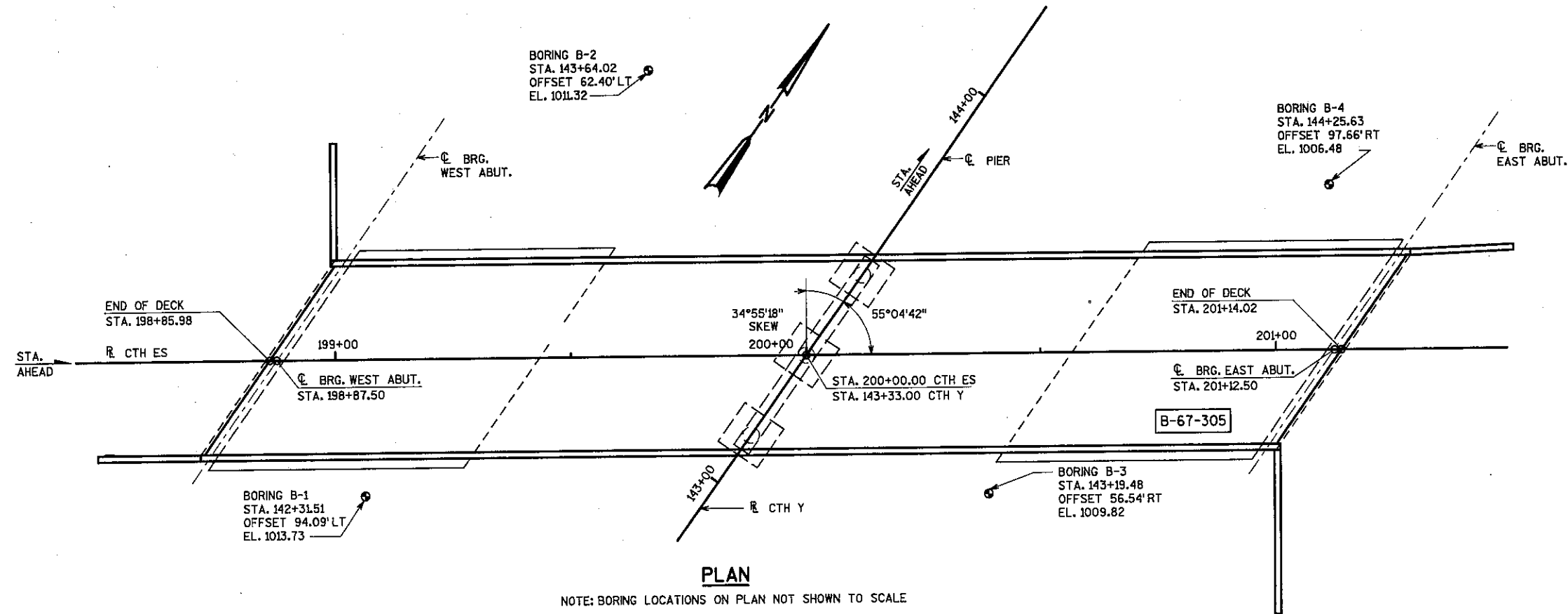
TO OBTAIN RELATIVE DATA CONCERNING THE CHARACTER OF MATERIAL IN AND UPON WHICH THE FOUNDATION MIGHT BE BUILT, BORINGS AND/OR SOUNDINGS WERE MADE AT POINTS APPROXIMATELY AS INDICATED ON THIS DRAWING. THE DATA PRESENTED HEREIN REPRESENTS THE FINDINGS OF THE SUBSURFACE EXPLORATIONS MADE. HOWEVER, BECAUSE THE DEPTHS INVESTIGATED ARE LIMITED AND THE AREA OF THE BORINGS AND/OR SOUNDINGS IS VERY SMALL IN RELATION TO THE ENTIRE AREA, THE WISCONSIN DEPARTMENT OF TRANSPORTATION DOES NOT WARRANT CONDITIONS BELOW THE DEPTHS INVESTIGATED OR THAT THE CLASSIFICATION OF MATERIAL ENCOUNTERED IN THESE INVESTIGATIONS IS NECESSARILY TYPICAL OF THE ENTIRE SITE.

NO.	DATE	REVISION	BY
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STRUCTURES DESIGN SECTION			
STRUCTURE		B-67-297	
DRAWN BY DDS		PLANS CK'D. CRJ	
SUBSURFACE EXPLORATION		SHEET 4	

8

8

SCALE =



STATE PROJECT NUMBER

04-2779(13)

ABBREVIATIONS

F— FINE M— MEDIUM C— COARSE
WS— WEATHERED SO— SOUND

MATERIAL SYMBOLS

TOPSOIL SILT SANDSTONE
SAND PEAT LIMESTONE
GRAVEL CLAY IGNEOUS ROCK

LEGEND OF PROBING

PROBING NO.
STA.
ELEVATION
95/6=95 BLOWS FOR 6"
PENETRATION
PROBING TAKEN WITH
A 350* WT.
FALLING 18" ON A 2"
O.D. POINT.
7 AVERAGE BLOWS PER FOOT
REFUSAL 95/6

LEGEND OF BORING

BORING NO.
STA.
ELEV.
UNCONFINED
STRENGTH → 7.7
BLOWS PER FT.
USING 140* WT.
FALLING 30"
WASH SAMPLE
SHELBY TUBE — S.T.
GROUND WATER
ELEVATION
NO GROUND WATER
OBSERVED ABOVE
THIS ELEVATION
SANDY GRAVEL
F. BOULDERS OR
COBBLES
SAND
SILTY CLAY
SO
LIMESTONE

UNLESS OTHERWISE SPECIFIED, THE BLOWS PER FOOT AT THE LOCATIONS INDICATED ARE BASED ON DRIVING A 2" O.D. X 1.4" I.D. SPLIT SPOON SAMPLER WITH A 140* HAMMER HAVING A FREE FALL OF 30". THE BLOW COUNT IS TAKEN IN UNDISTURBED SOIL IMMEDIATELY BELOW A CASED OR OPEN HOLE ELIMINATING SIDE FRICTION ON THE DRIVE PIPE.

SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN AND BIDDERS INFORMATION

TO OBTAIN RELATIVE DATA CONCERNING THE CHARACTER OF MATERIAL IN AND UPON WHICH THE FOUNDATION MIGHT BE BUILT, BORINGS AND/OR SOUNDINGS WERE MADE AT POINTS APPROXIMATELY AS INDICATED ON THIS DRAWING. THE DATA PRESENTED HEREIN REPRESENTS THE FINDINGS OF THE SUBSURFACE EXPLORATIONS MADE. HOWEVER, BECAUSE THE DEPTHS INVESTIGATED ARE LIMITED AND THE AREA OF THE BORINGS AND/OR SOUNDINGS IS VERY SMALL IN RELATION TO THE ENTIRE AREA, THE WISCONSIN DEPARTMENT OF TRANSPORTATION DOES NOT WARRANT CONDITIONS BELOW THE DEPTHS INVESTIGATED OR THAT THE CLASSIFICATION OF MATERIAL ENCOUNTERED IN THESE INVESTIGATIONS IS NECESSARILY TYPICAL OF THE ENTIRE SITE.

NO.	DATE	REVISION	BY
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STRUCTURES DESIGN SECTION			
STRUCTURE B-67-305			
CONST. SPEC.	2009	DRAWN BY WJ	PLANS CKD. YB
SUBSURFACE EXPLORATION			SHEET 3 OF 20
			220



Appendix B-12 – Summary of WDNR Water Wells Near Route Alternatives



WDNR WELL RECORDS RESEARCH

Section 20, T6N R20E									
WI Unique Well No (before 1987)	WI Unique Well No (After 1987)	Municipality	Well Address	Completion Date (mm/dd/yyyy)	Constructor	Status	Well Depth (ft)	"Hardpan" Depth (ft)	Bedrock Depth (ft)
	CX038	NEW BERLIN	4530 S RACINE AVE	3/14/1991	HERR WELL DRILLING INC	New Well	285		76
	DV099	NEW BERLIN		8/2/1991		New Well	40		
	FO186	NEW BERLIN	19685 W OBSERVATORY RD	1/12/1993	ROSCHI BROS WELL DRLG @ PUMP INC	New Well	179	66	72
	KT787	NEW BERLIN		9/12/1996		New Well	107		65
	SM393	NEW BERLIN	20640 W KOHLER CT	8/31/2004	HERR WELL DRILLING INC	New Well	142		75
	TA 598	NEW BERLIN		9/21/2005		New Well	100		42
WK18921		NEW BERLIN		7/11/1972		New Well	164		29
WK18922		NEW BERLIN		6/24/1972		New Well	140		27
WK18923		NEW BERLIN		9/8/1972		New Well	135		24
WK18943		NEW BERLIN		12/19/1972		New Well	145	22	30
WK18944		NEW BERLIN		8/20/1976		New Well	150		76
WK18945		NEW BERLIN		11/6/1956		New Well	66	30	38
WK18946		NEW BERLIN		9/23/1963		New Well	84		56
WK18947		NEW BERLIN		6/16/1973		New Well	174	28	48
WK18948		NEW BERLIN		8/23/1977		New Well	150	24	56
WK18949		NEW BERLIN		4/19/1967		New Well	130	42	60
WK18956		NEW BERLIN		9/6/1977		New Well	185	0	59
WK18968		NEW BERLIN	17725 OBSERVATORY RD	5/30/1971	AQUA WELL DRILLING & PUMP	New Well	100	37	43

Section 28, T6N R20E									
WI Unique Well No (before 1987)	WI Unique Well No (After 1987)	Municipality	Well Address	Completion Date (mm/dd/yyyy)	Constructor	Status	Well Depth (ft)	"Hardpan" Depth (ft)	Bedrock Depth (ft)
WK40837	AC745	NEW BERLIN	17825 W BELOIT RD	3/17/1988	ROSCHI BROS WELL DRLG @ PUMP INC	New Well	165		9
	AT720	NEW BERLIN	17855 BELOIT RD	12/8/1988	ROSCHI BROS WELL DRLG @ PUMP INC	New Well	163		19
	AY260	NEW BERLIN	S50 W17975 W BELOIT RD	7/20/1988	MICHAEL HARTMAN	New Well	135		22
WK40836	AZ021	NEW BERLIN	17795 W BELOIT RD	6/7/1988	ROSCHI BROS WELL DRLG @ PUMP INC	New Well	165		15
	DA697	NEW BERLIN	18378 HILLCREST DR	5/15/1991	HERR WELL DRILLING INC	New Well	165		75
	DA698	NEW BERLIN	18172 W HILLCREST DR	5/15/1991	HERR WELL DRILLING INC	New Well	105		47
	DF468	MUSKEGO	18339 W HILLSIDE DR	12/6/1990	HERR WELL DRILLING INC	New Well	105		42
	EK777	NEW BERLIN		9/6/1991		New Well	165	0	44

WI Unique Well No (before 1987)	WI Unique Well No (After 1987)	Municipality	Well Address	Completion Date (mm/dd/yyyy)	Constructor	Status	Well Depth (ft)	"Hardpan" Depth (ft)	Bedrock Depth (ft)
	FO014	NEW BERLIN	18255 HILLSIDE DR	11/11/1992	HERR WELL DRILLING INC	New Well	143		42
	FQ825	NEW BERLIN	4847 TRILLUM DR	12/31/1992	HERR WELL DRILLING INC	New Well	184		42
	GE680	NEW BERLIN		5/21/1993		New Well	83		21
	GF129	NEW BERLIN		9/27/1993		New Well	145		43
	GF772	NEW BERLIN		7/28/1993		New Well	128		104
	GF796	NEW BERLIN		12/5/1993		New Well	68		43
	GI097	NEW BERLIN	18675 W HILLCREST DR	9/7/1993	HERR WELL DRILLING INC	New Well	165		87
	GK529	NEW BERLIN	17955 W NATIONAL AVE	6/28/1993	HERR WELL DRILLING INC	New Well	165		46
	HM726	NEW BERLIN	18777 W HILLCREST DR	12/16/1993	HERR WELL DRILLING INC	New Well	165		90
	HO761	NEW BERLIN		4/21/1995		New Well	185		78
	HR483	NEW BERLIN		5/3/1994		New Well	125		24
	HT332	NEW BERLIN	5475 S MAJORS DR	10/21/1994	EGOFSKE PORTER DRILLING INC	Replacement	160	11	21
	HT503	NEW BERLIN	18430 HILLCREST DR	7/29/1994	ROSCHI BROS WELL DRLG @ PUMP INC	New Well	180	67	78
	HT856	NEW BERLIN	17500 W BERES RD	6/1/1994	HERR WELL DRILLING INC	New Well	145		20
	HT859	NEW BERLIN	17550 W STEVEN DR	6/2/1994	HERR WELL DRILLING INC	New Well	145		23
	IE509	NEW BERLIN	18620 HILLCREST DR	12/19/1994	ROSCHI BROS WELL DRLG @ PUMP INC	New Well	200	87	99
	KT595	NEW BERLIN	18405 W HILLSIDE DR	4/2/1996	HERR WELL DRILLING INC	New Well	145		35
	OC366	NEW BERLIN		10/23/2000		New Well	124		65
	OG110	NEW BERLIN	5165 S BRENNAN AVE	7/21/2000	ROSCHI BROS WELL DRLG & PUMP INC	New Well	151		12
	QL791	NEW BERLIN	5220 S BRENNAN DR	11/13/2001	HERR WELL DRILLING INC	Replacement	145		13
	QQ214	NEW BERLIN	5215 S BRENNAN DR	12/11/2001	HERR WELL DRILLING INC	New Well	145		15
	QQ262	NEW BERLIN	5125 S BRENNAN DR	12/14/2001	HERR WELL DRILLING INC	New Well	145		15
	QQ264	NEW BERLIN	5155 BRENNEN DR	12/12/2001	HERR WELL DRILLING INC	New Well	145		12
	QQ265	NEW BERLIN	5145 S BRENNAN DR	12/17/2001	HERR WELL DRILLING INC	New Well	145		15
	RS648	NEW BERLIN		10/16/2003		Replacement	125		12
	RS689	NEW BERLIN		3/1/2004		New Well	145		8
	SG022	NEW BERLIN	5255 S BRENNAN DR	5/28/2004	HERR WELL DRILLING INC	Reconstruction	180		<85

WI Unique Well No (before 1987)	WI Unique Well No (After 1987)	Municipality	Well Address	Completion Date (mm/dd/yyyy)	Constructor	Status	Well Depth (ft)	"Hardpan" Depth (ft)	Bedrock Depth (ft)
	SG077	NEW BERLIN	5255 S BRENNAN DR	4/19/2004	HERR WELL DRILLING INC	Reconstruction	180		<85
	TD571	NEW BERLIN		11/16/2005		New Well	140		31
	TG855	NEW BERLIN		1/11/2006		New Well	123	8	90
	TS966	NEW BERLIN		11/9/2004		New Well	120		7
	TU223	NEW BERLIN	5455 ANN ST	7/26/2005	ROSCHI BROS WELL DRLG & PUMP INC	New Well	125		7
WK20081		NEW BERLIN	Hwy I, 1/2 mi. SE on HWY 15	12/22/1955	B&B CONSTRUCTION	New Well	97		35
WK20146		NEW BERLIN	LOT 112 - PROSPECT HEIGHTS	7/6/1961	TOMSINGER CONSTRUCTION	New Well	76		20
WK20150		NEW BERLIN		5/22/1952		New Well	86		26
WK20152		NEW BERLIN		7/3/1956		New Well	101		18
WK20153		NEW BERLIN		1/27/1954		New Well	105		14
WK20155		NEW BERLIN		3/7/1954		New Well	116		20
WK20189		NEW BERLIN		11/28/1975		New Well	152		20
WK20273		NEW BERLIN		5/7/1954		New Well	93		30

Section 20, T6N R21E									
WI Unique Well No (before 1987)	WI Unique Well No (After 1987)	Municipality	Well Address	Completion Date (mm/dd/yyyy)	Constructor	Status	Well Depth (ft)	"Hardpan" Depth (ft)	Bedrock Depth (ft)
ML7171		GREENFIELD		11/7/1964		New Well	68	30	43
ML7172		GREENFIELD		12/26/1962		New Well	70	44	48
ML7173		GREENFIELD		6/18/1962		New Well	72		56
ML7174		GREENFIELD		8/29/1964		New Well	67		45

Notes:

The searched areas were selected based on the areas of bedrock <50' deep, as shown on the SEWRPC Bedrock Map presented in **Appendix B-4**.
Wells where shallow bedrock was recorded, that are located near one of the route alternatives are shaded in yellow.
Well Construction Reports for wells shaded in yellow are close to Route Alternative M3, and presented in **Appendix B-13**.



Appendix B-13 – Shallow Bedrock in WDNR Wells Near Route Alternatives



Well Construction Report For WISCONSIN UNIQUE WELL NUMBER AC745

State of Wisconsin
Department of Natural Resources
Private Water Supply — WS/2
Box 7921
Madison, WI 53707 WK-3882-D

MAR 31 1988

Property Owner Telephone Number
Parr Construction () 662-2340

Mailing Address

W231 S8635 Villa Drive

City State Zip Code

Big Bend, Wisconsin 53103

County 68
Waukesha

County Well Location
Permit No. W

Well Completion
Date 03 17 88
M M D D Y Y

Well Constructor (Business Name) License #

Roschi Bros., Inc. WD435

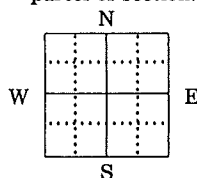
Address

12665 W. Lisbon Road

City State Zip Code

Brookfield, Wis. 53005

2. Mark well location
in correct 40-acre
parcel of section.



1. Location (Please type or print using a black pen.)

☐ Town ☒ City ☐ Village Fire # (if available)
of New Berlin

Grid or Street Address or Road Name and Number (if available)
17825 W. Beloit Road

Subdivision Name Lot # Block #

Gov't Lot # NW of NW 1/4 of SE 1/4 of
Section 28; T 6 N; R 20 E ☒ E ☐ W

3. Well Type ☒ New

☐ Replacement ☐ Reconstruction/Rehabilitation

of well constructed in 19 ____.

Reason for new, reconstructed, replaced, or rehabilitated
well?

new house

☒ Drilled ☐ Driven Point ☐ Jetted ☐ Other ____

4. Well serves 1 # of homes and/or house
(ex: barn, restaurant, church, school, industry, etc.)

High Capacity Well? ☐ Yes ☒ No

High Capacity Property? ☐ Yes ☒ No

5. Well Located on Highest Point of Property, Consistent with the General Layout and Surroundings? ☒ Yes ☐ No

Well Located in Floodplain? ☐ Yes ☒ No 12

Distance In Feet From Well To Nearest:

1. Landfill

11 2. Building Overhang

3. Septic or Holding Tank

4. Sewage Absorption Unit

5. Nonconforming Pit

6. Buried Home Heating Oil Tank

7. Buried Petroleum Tank

8. Shoreline/Swimming Pool

12

48

45

13'6"

9. Downspout/Yard Hydrant

10. Privy

11. Foundation Drain to Clearwater

12. Foundation Drain to Sewer

13. Building Drain

☒ Cast Iron or Plastic ☐ Other

14. Building Sewer ☐ Gravity ☐ Pressure

☐ Cast Iron or Plastic ☐ Other

15. Collector Sewer

16. Clearwater Sump

17. Wastewater Sump

18. Paved Animal Barn Pen

19. Animal Yard or Shelter

20. Silo — Type ____

21. Barn Gutter

22. Manure Pipe ☐ Gravity ☐ Pressure

☐ Cast Iron or Plastic ☐ Other

23. Other Manure Storage ____

Other NR 112 Waste Source

24. ____

6. Drillhole Dimensions

From To
Dia. (in.) (ft.) (ft.)

10 surface 20

8 20 46

6 46 165

Method of constructing upper enlarged
drillhole. (If applicable ☒ more than one.)

☒ 1. Rotary — Mud Circulation

☐ 2. Rotary — Air

☐ 3. Rotary — Foam

☐ 4. Reverse Rotary

☐ 5. Cable-tool Bit ____ in. dia.

☐ 6. Temp. Outer Casing ____ in. dia.

Removed? ☐ Yes ☐ No

If no, explain ____

☐ 7. Other ____

7. Casing, Liner, Screen

Material, Weight, Specification
Dia. (in.) Mfg. & Method of Assembly

6" black steel pipe, welded
joints, 18.97 lb. ASTM

A120 1200 psi Korean

surface

46

9. Geology
Type, Caving/Noncaving, Color, Hardness, Etc.

From To
(ft.) (ft.)

-C- Clay surface 9

-L- Limestone 9 165

12. Well Is:

☒ Above Grade
8 in. ☐ Below

Developed? ☒ Yes ☐ No

Disinfected? ☒ Yes ☐ No

Capped? ☒ Yes ☐ No

10. Static Water Level

10 ft. below ground surface

11. Pump Test

Pumping Level 16 ft. below surface

Pumping at 12 GPM for 2 hours

13. Were all unused, noncomplying, or unsafe wells properly filled with sealant?

☐ Yes ☐ No

If no, explain ____

14. Signature of Well Constructor

Signature

Signature

Date Signed

3-17-88

Date Signed

Make additional comments on reverse side about geology, etc.

WK 40837

DEP

WELL CONSTRUCTION REPORT
Form 3300-77A Rev. 8-87

<div>Well Construction Report For WISCONSIN UNIQUE WELL NUMBER AT720</div>				State of WI - Private Water Systems - DG/2 Department of Natural Resources, Box 7921 Madison, WI 53707 Please type or Print using a black Pen Please Use Decimals Instead of Fractions.				Form 3300-77A (R 8/00)			
Property Owner PARR CONSTRUCTION				Telephone 414-662-2340 Number							
Mailing Address W231 S8635 VILLA DR								1. Well Location <input type="checkbox"/> Town <input checked="" type="checkbox"/> City <input type="checkbox"/> Village of NEW BERLIN		Fire # (if available)	
City BIG BEND				State WI		Zip Code 53103		Grid or Street Address or Road Name and Number 17855 BELOIT RD			
County of Well Location Waukesha		County Well Permit No. W		Well Completion Date 12/08/1988				Subdivision Name		Lot # Block #	
Well Constructor (Business Name) ROSCHI BROS WELL DRLG @ P		License # 435		Facility ID Number (Public Wells)				Gov't Lot # or NW 1/4 of SE 1/4 of Section 28 T 6 N; R 20 <input checked="" type="checkbox"/> E <input type="checkbox"/> W Latitude Deg. Min. Longitude Deg. Min.		Lat/Long Method GPS008	
Address 12665 W LISBON RD				Public Well Plan Approval # W--				2. Well Type <input checked="" type="checkbox"/> New <input type="checkbox"/> Replacement <input type="checkbox"/> Reconstruction			
City BROOKFIELD		State WI		Zip Code 53005-1824		Date of Approval (mm/dd/yyyy)		of previous unique well # constructed in Reason for replaced or Reconstructed Well? NEW HOUSE			
Hicap Permanent well #		Common Well #		Specific Capacity 1.2 gpm/ft				<input checked="" type="checkbox"/> Drilled <input type="checkbox"/> Driven Point <input type="checkbox"/> Jetted <input type="checkbox"/> Other:			
3. Well serves 1 # of homes and/or (e.g. barn, restaurant, church, school, industry, etc.)				High capacity Well? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Property? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
4. Is the well located upslope or sideslope and not downslope from any contamination source, including those on neighboring properties? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No											
Well located within 1,200 feet of a quarry? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, distance in feet from quarry:											
Well located in floodplain? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No											
Distance in Feet from Well to Nearest:											
1. Landfill 13 9. Downspout/Yard Hydrant 17. Wastewater Sump											
12. Building Overhang 10. Privy 18. Paved Animal Barn Pen											
71 3. Septic <input type="checkbox"/> Holding Tank <input type="checkbox"/> 11. Foundation Drain to Clearwater 19. Animal Yard or Shelter											
86 4. Sewage Absorption Unit 12. Foundation Drain to Sewer 20. Silo											
5. Nonconforming Pit 13. Building Drain 21. Barn Gutter											
6. Buried Home Heating Oil Tank 14. Building Sewer <input type="checkbox"/> Gravity <input type="checkbox"/> Pressure 22. Manure Pipe <input type="checkbox"/> Gravity <input type="checkbox"/> Pressure											
7. Buried Petroleum Tank 15. Collector or Street Sewer: <input type="checkbox"/> Cast Iron or Plastic <input type="checkbox"/> Other <input type="checkbox"/> Cast Iron or Plastic <input type="checkbox"/> Other 23. Other Manure Storage											
8. Shoreline <input type="checkbox"/> Swimming Pool <input type="checkbox"/> 16. Clearwater Sump 24. Ditch											
5. Drillhole Dimensions and Construction Method											
8. Geology											
From To Upper Lower											
Dia (in.) (ft.) (ft.) Enlarged Drillhole Open Bedrock											
10 0 42 <input checked="" type="checkbox"/> ---1. Rotary - Mud Circulation----- <input type="checkbox"/>											
<input type="checkbox"/> ---2. Rotary - Air----- <input type="checkbox"/>											
<input type="checkbox"/> ---3. Rotary - Air and Foam----- <input type="checkbox"/>											
<input type="checkbox"/> ---4. Drill-Through Casing Hammer											
<input type="checkbox"/> ---5. Reverse Rotary											
<input type="checkbox"/> ---6. Cable-tool Bit in. dia----- <input type="checkbox"/>											
<input type="checkbox"/> 7. Dual Rotary <input type="checkbox"/>											
<input type="checkbox"/> 8. Temp. Outer Casing in. dia. depth (ft)											
Removed? <input type="checkbox"/> Yes <input type="checkbox"/> No											
If no, why not?											
6. Casing, Liner, Screen Material, Weight, Specification From To											
Dia. (in.) (ft.) (ft.)											
6 BLACK STEEL PIPE WELDED JOINTS 18.97 0 42											
LB ASTM A531780 PSI CHILE											
9. Static Water Level											
ft. above ground surface											
22 ft. below ground surface											
11. Well is: <input checked="" type="checkbox"/> Above Grade											
8 in. <input type="checkbox"/> Below Grade											
Developed? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No											
Disinfected? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No											
Capped? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No											
10. Pump Test											
Pumping Level 34 ft. below surface											
Pumping at 14 GPM for 3 hours											
12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property?											
<input type="checkbox"/> Yes <input type="checkbox"/> No If no, explain:											
13. Signature of the Well Constructor or Supervisory Driller Date signed											
RR 12/08/1988											
Signature of Drill Rig Operator (Mandatory unless same as above) Date signed											
NEAT CEMENT AND 0 0											
GALS TO 1 BAY 42											
Make additional comments on reverse side about geology, additional screens, water quality, etc.											
Variance issued <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No											

<div>Well Construction Report For WISCONSIN UNIQUE WELL NUMBER AY260</div>				State of WI - Private Water Systems - DG/2 Department of Natural Resources, Box 7921 Madison, WI 53707 Please type or Print using a black Pen Please Use Decimals Instead of Fractions.				Form 3300-77A (R 8/00)			
Property Owner WOLTER BROTHER BUILDERS				Telephone 414-784-3070 Number							
Mailing Address 14700 W NATIONAL AVE				1. Well Location <input type="checkbox"/> Town <input checked="" type="checkbox"/> City <input type="checkbox"/> Village of NEW BERLIN				Fire # (if available)			
City NEW BERLIN				State WI		Zip Code 53151		Grid or Street Address or Road Name and Number S50 W17975 W BELOIT RD			
County of Well Location Waukesha		County Well Permit No. W		Well Completion Date 07/20/1988		Subdivision Name		Lot #		Block #	
Well Constructor (Business Name) MICHAEL HARTMAN		License # 436		Facility ID Number (Public Wells)		Gov't Lot #		or NW 1/4 of SE 1/4 of			
Address W82 N28280 MARSHALL		Public Well Plan Approval # W--		Section 28		T 6 N; R 20		<input checked="" type="checkbox"/> E <input type="checkbox"/> W			
City HARTLAND		State WI Zip Code 53029		Date of Approval (mm/dd/yyyy)		2. Well Type <input checked="" type="checkbox"/> New		Lat/Long Method GPS008			
Hicap Permanent well #		Common Well #		Specific Capacity 2.1 gpm/ft		<input type="checkbox"/> Replacement <input type="checkbox"/> Reconstruction					
3. Well serves 1 # of homes and/or (e.g. barn, restaurant, church, school, industry, etc.)				High capacity Well? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Property? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input checked="" type="checkbox"/> Drilled <input type="checkbox"/> Driven Point <input type="checkbox"/> Jetted <input type="checkbox"/> Other:			
4. Is the well located upslope or sideslope and not downslope from any contamination source, including those on neighboring properties? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No											
Well located within 1,200 feet of a quarry? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, distance in feet from quarry:											
Well located in floodplain? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No											
Distance in Feet from Well to Nearest:											
1. Landfill 16 2. Building Overhang 3. Septic <input type="checkbox"/> Holding Tank <input type="checkbox"/> 4. Sewage Absorption Unit 5. Nonconforming Pit 6. Buried Home Heating Oil Tank 7. Buried Petroleum Tank 8. Shoreline <input type="checkbox"/> Swimming Pool <input type="checkbox"/> 9. Downspout/Yard Hydrant 10. Privy 11. Foundation Drain to Clearwater 12. Foundation Drain to Sewer 13. Building Drain <input type="checkbox"/> Cast Iron or Plastic <input type="checkbox"/> Other 14. Building Sewer <input type="checkbox"/> Gravity <input type="checkbox"/> Pressure <input type="checkbox"/> Cast Iron or Plastic <input type="checkbox"/> Other 15. Collector or Street Sewer: <input type="checkbox"/> Sanitary units in. diam. <input type="checkbox"/> Storm <input type="checkbox"/> =< 6 <input type="checkbox"/> > 6 16. Clearwater Sump 17. Wastewater Sump 18. Paved Animal Barn Pen 19. Animal Yard or Shelter 20. Silo 21. Barn Gutter 22. Manure Pipe <input type="checkbox"/> Gravity <input type="checkbox"/> Pressure <input type="checkbox"/> Cast Iron or Plastic <input type="checkbox"/> Other 23. Other Manure Storage 24. Ditch 25. Other NR 812 Waste Storage											
5. Drillhole Dimensions and Construction Method				8. Geology							
From To Upper Lower Dia (in.) (ft.) (ft.) Enlarged Drillhole Open Bedrock				Type, Caving/Noncaving, Color, Hardness, etc							
10 0 42				--G-- GRAVEL 0 22							
				--L-- LIMESTONE 22 135							
6. Casing, Liner, Screen Material, Weight, Specification From To Dia. (in.) (ft.) (ft.)				9. Static Water Level							
6 A-53 0.280 WALL 19 LBS PER FT. SUMOTO WELDED 0 42				ft. above ground surface 20 ft. below ground surface							
Dia. (in.) Screen type, material & slot size				10. Pump Test							
				Pumping Level 27 ft. below surface							
				Pumping at 15 GPM for 4 hours							
7. Grout or Other Sealing Material. Method: From To # Sacks Kind of Sealing Material (ft.) (ft.) Cement				11. Well is: <input checked="" type="checkbox"/> Above Grade 12 in. <input type="checkbox"/> Below Grade Developed? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Disinfected? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Capped? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No							
CEMENT 0 42 10				12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If no, explain:							
				13. Signature of the Well Constructor or Supervisory Driller Date signed MH 08/03/1980							
				Signature of Drill Rig Operator (Mandatory unless same as above) Date signed							
Make additional comments on reverse side about geology, additional screens, water quality, etc.											
Variance issued <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No											

First Water Quality Test For WISCONSIN UNIQUE WELL NUMBER AZ 021

Property Owner **Epic Homes, Inc.** Telephone Number **(414) 774-4424**

Mailing Address
2625 N. 124th Street
City **Wauwatosa, Wisconsin** State **53226** Zip Code

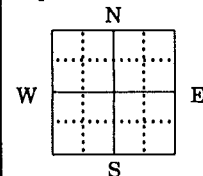
County **Waukesha** County Well Location Permit No. **W** Well Completion Date **06/07/88**
M M D D Y Y

Well Constructor (Business Name) Registration #
Roschi Bros., Inc. WD435

Address
12665 W. Lisbon Road
City **Brookfield, Wis.** State **53005** Zip Code

17795 W. Beloit Road

2. Mark well location
in correct 40-acre
parcel of section.



JUN 21 1988 State of Wisconsin
Department of Natural Resources
Private Water Supply — WS/2
Box 7921
Madison, WI 53707 **WK-3881-D**

1. Location (Please type or print using a black pen.)
☐ Town ☒ City ☐ Village Fire # (if available)
of **New Berlin**

Grid or Street Address or Road Name and Number (if available)
17795 W. Beloit Road

Subdivision Name Lot # Block #

Gov't Lot # **NE** of NW 1/4 of SE 1/4 of
Section **28**; T **6** N; R **20** ☒ E ☐ W

3. Well Type ☒ New
☐ Replacement ☐ Reconstruction/Rehabilitation

of well constructed in 19 ____.

Reason for new, reconstructed, replaced, or rehabilitated well?

new house

☒ Drilled ☐ Driven Point ☐ Jetted ☐ Other

4. Well serves 1 # of homes and/or _____
(ex: barn, restaurant, church, school, industry, etc.)

High Capacity Well? ☐ Yes ☒ No

High Capacity Property? ☐ Yes ☒ No

5. Well Located on Highest Point of Property, Consistent with the General Layout and Surroundings? ☒ Yes ☐ No

Well Located in Floodplain? ☐ Yes ☒ No
Distance In Feet From Well To Nearest:

- 12 1. Landfill
- 42 2. Building Overhang
- 96 3. Septic or Holding Tank
4. Sewage Absorption Unit
5. Nonconforming Pit
6. Buried Home Heating Oil Tank
7. Buried Petroleum Tank
8. Shoreline/Swimming Pool

- 14 9. Downspout/Yard Hydrant
10. Privy
11. Foundation Drain to Clearwater
12. Foundation Drain to Sewer
13. Building Drain
☐ Cast Iron or Plastic ☐ Other
14. Building Sewer ☐ Gravity ☐ Pressure
☐ Cast Iron or Plastic ☐ Other
15. Collector Sewer
16. Clearwater Sump

17. Wastewater Sump
18. Paved Animal Barn Pen
19. Animal Yard or Shelter
20. Silo — Type _____
21. Barn Gutter
22. Manure Pipe ☐ Gravity ☐ Pressure
☐ Cast Iron or Plastic ☐ Other
23. Other Manure Storage _____
Other NR 112 Waste Source
24. _____

6. Drillhole Dimensions

Dia. (in.)	From (ft.)	To (ft.)
10	surface	20
8 8	20	42
6	42	165

Method of constructing upper enlarged drillhole. (If applicable ✓ more than one.)

- ☒ 1. Rotary — Mud Circulation
☐ 2. Rotary — Air
☐ 3. Rotary — Foam
☐ 4. Reverse Rotary
☐ 5. Cable-tool Bit _____ in. dia.
☐ 6. Temp. Outer Casing _____ in. dia.
Removed? ☐ Yes ☐ No
If no, explain _____
☐ 7. Other _____

9.

Geology	From (ft.)	To (ft.)
Type, Caving/Noncaving, Color, Hardness, Etc.		
CC stoney clay	surface	15
L limestone	15	165

7.

Casing, Liner, Screen	From (ft.)	To (ft.)
Material, Weight, Specification		
Mfg. & Method of Assembly		
6 black steel pipe, welded joints, 18.97 lb. ASTM	surface	
A120 1200 psi Korean		42

8.

Grout or Other Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
Method			
Kind of Sealing Material			
clear cement & water	surface		
5½ gals. to 1 bag		42	9

10. Static Water Level

____ ft. above ground level
20 ft. below ground surface

11. Pump Test

Pumping Level 20 ft. below surface
Pumping at 30 GPM for 2 hours

12. Well Is:

8 in. ☒ Above Grade
☐ Below
Developed? ☒ Yes ☐ No
Disinfected? ☒ Yes ☐ No
Capped? ☒ Yes ☐ No

13. Were all unused, noncomplying, or unsafe wells properly filled with sealant?
☐ Yes ☐ No If no, explain _____

14. Signature of Well Constructor **ERW** Date Signed **6-13-88**
Signature of Building Operator _____ Date Signed _____

Make additional comments on reverse side about geology, etc.

WK 40836

DNR

WELL CONSTRUCTION REPORT
Form 3300-77A Rev. 1-88

Well Construction Report For WISCONSIN UNIQUE WELL NUMBER				OG110		State of WI - Private Water Systems - DG/2 Department of Natural Resources, Box 7921 Madison, WI 53707 Please type or Print using a black Pen Please Use Decimals Instead of Fractions.		Form 3300-77A (R 8/00)			
Property Owner				Telephone Number				1. Well Location <input type="checkbox"/> Town <input checked="" type="checkbox"/> City <input type="checkbox"/> Village of NEW BERLIN		Fire # (if available)	
Mailing Address				City				State		Zip Code	
County of Well Location Waukesha				County Well Permit No. W		Well Completion Date 07/21/2000					
Well Constructor (Business Name) ROSCHI BROS WELL DRLG & P				License # 435		Facility ID Number (Public Wells)				Gov't Lot # or NW 1/4 of SW 1/4 of	
Address N10W28210 NORTHVIEW RD				Public Well Plan Approval # W--				Section 28 T 6 N; R 20 <input checked="" type="checkbox"/> E <input type="checkbox"/> W			
City WAUKESHA				State WI		Zip Code 53188-9401		Latitude Deg. Min. Longitude Deg. Min.			
Hicap Permanent well #				Common Well #		Specific Capacity 1.1 gpm/ft				2. Well Type <input checked="" type="checkbox"/> New <input type="checkbox"/> Replacement <input type="checkbox"/> Reconstruction	
3. Well serves 1 # of homes and/or (e.g. barn, restaurant, church, school, industry, etc.)				High capacity Well? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Property? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				Lat/Long Method GPS008	
4. Is the well located upslope or sideslope and not downslope from any contamination source, including those on neighboring properties? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				Well located within 1,200 feet of a quarry? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, distance in feet from quarry:				5. Drillhole Dimensions and Construction Method			
Well located in floodplain? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				Distance in Feet from Well to Nearest:				6. Casing, Liner, Screen Material, Weight, Specification			
1. Landfill				12. Building Overhang				From (ft.) To (ft.)			
2. Septic Holding Tank				3. Sewage Absorption Unit				Enlarged Drillhole			
4. Nonconforming Pit				5. Buried Home Heating Oil Tank				Upper			
6. Buried Petroleum Tank				7. Buried Petroleum Tank				Lower			
8. Shoreline Swimming Pool				9. Downspout/Yard Hydrant				Open Bedrock			
10. Privy				11. Foundation Drain to Clearwater				Dia. (in.)			
11. Foundation Drain to Sewer				12. Foundation Drain to Sewer				From (ft.) To (ft.)			
13. Building Drain				14. Building Sewer				Upper			
Cast Iron or Plastic Other				Gravity Pressure				Enlarged Drillhole			
15. Collector or Street Sewer:				Sanitary units in. diam.				Lower			
Storm <= 6 > 6				16. Clearwater Sump				Open Bedrock			
17. Wastewater Sump				18. Paved Animal Barn Pen				Dia. (in.)			
19. Animal Yard or Shelter				20. Silo				From (ft.) To (ft.)			
21. Barn Gutter				22. Manure Pipe				Enlarged Drillhole			
Gravity Pressure				Cast Iron or Plastic Other				Upper			
23. Other Manure Storage				24. Ditch				Lower			
25. Other NR 812 Waste Storage				8. Geology				From (ft.) To (ft.)			
Type, Caving/Noncaving, Color, Hardness, etc				--CG STONEY CLAY 0 12				Dia. (in.)			
--L- LIMESTONE 12 151				9. Static Water Level				11. Well is:			
ft. above ground surface				21 ft. below ground surface				12 in. Above Grade Below Grade			
10. Pump Test				Pumping Level 33 ft. below surface				Developed? Yes No			
Pumping at 13 GPM for 2.5 hours				Capped? Yes No				Disinfected? Yes No			
7. Grout or Other Sealing Material. Method: HALIBURTON-SNGL. PLUG				From (ft.) To (ft.) # Sacks Cement				12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property?			
Kind of Sealing Material				CLEAR CEMENT & WATER 5 1/2 GAL 0 60 19				Yes No If no, explain:			
Signature of the Well Constructor or Supervisory Driller				Date signed				13. Signature of the Well Constructor or Supervisory Driller			
RR				07/21/2000				RR			
Signature of Drill Rig Operator (Mandatory unless same as above)				Date signed				Signature of Drill Rig Operator (Mandatory unless same as above)			
TDK				07/21/2000				TDK			
Make additional comments on reverse side about geology, additional screens, water quality, etc.				Variance issued Yes No				X No			

Well Construction Report For WISCONSIN UNIQUE WELL NUMBER QQ214				State of WI - Private Water Systems - DG/2 Department of Natural Resources, Box 7921 Madison, WI 53707 Please type or Print using a black Pen Please Use Decimals Instead of Fractions.		Form 3300-77A (R 8/00)	
Property Owner			Telephone Number				
Mailing Address						1. Well Location	
City			State		Zip Code		<input type="checkbox"/> Town <input checked="" type="checkbox"/> City <input type="checkbox"/> Village of NEW BERLIN
County of Well Location		County Well Permit No.		Well Completion Date		Fire # (if available)	
Waukesha		W		12/11/2001			
Well Constructor (Business Name)			License #		Facility ID Number (Public Wells)		Gov't Lot #
HERR WELL DRILLING INC			672				or NW 1/4 of SW 1/4 of
Address			Public Well Plan Approval #		Section 28		T 6 N; R 20
W295 HERR RD			W--		Latitude Deg. Min.		<input checked="" type="checkbox"/> E <input type="checkbox"/> W
City		State		Zip Code		Longitude Deg. Min.	
DOUSMAN		WI		53118-9407		2. Well Type	
						<input checked="" type="checkbox"/> New	
						<input type="checkbox"/> Replacement <input type="checkbox"/> Reconstruction	
Hicap Permanent well #		Common Well #		Specific Capacity		Lat/Long Method	
				.5 gpm/ft		GPS008	
3. Well serves 1 # of homes and/or (e.g. barn, restaurant, church, school, industry, etc.)				High capacity Well? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		of previous unique well # constructed in	
				Property? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Reason for replaced or Reconstructed Well?	
4. Is the well located upslope or sideslope and not downslope from any contamination source, including those on neighboring properties?				<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
Well located within 1,200 feet of a quarry? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, distance in feet from quarry:							
Well located in floodplain? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No							
Distance in Feet from Well to Nearest:							
1. Landfill				9. Downspout/Yard Hydrant		17. Wastewater Sump	
15 2. Building Overhang				10. Privy		18. Paved Animal Barn Pen	
60 3. Septic <input checked="" type="checkbox"/> Holding Tank <input type="checkbox"/>				11. Foundation Drain to Clearwater		19. Animal Yard or Shelter	
90 4. Sewage Absorption Unit				12. Foundation Drain to Sewer		20. Silo	
5. Nonconforming Pit				13. Building Drain		21. Barn Gutter	
6. Buried Home Heating Oil Tank				<input type="checkbox"/> Cast Iron or Plastic <input type="checkbox"/> Other		22. Manure Pipe <input type="checkbox"/> Gravity <input type="checkbox"/> Pressure	
7. Buried Petroleum Tank				14. Building Sewer <input type="checkbox"/> Gravity <input type="checkbox"/> Pressure		<input type="checkbox"/> Cast Iron or Plastic <input type="checkbox"/> Other	
				<input type="checkbox"/> Cast Iron or Plastic <input type="checkbox"/> Other		23. Other Manure Storage	
				15. Collector or Street Sewer:		24. Ditch	
				<input type="checkbox"/> Sanitary units in. diam.			
				<input type="checkbox"/> Storm <input type="checkbox"/> =< 6 <input type="checkbox"/> > 6			
8. Shoreline <input type="checkbox"/> Swimming Pool <input type="checkbox"/>				16. Clearwater Sump		25. Other NR 812 Waste Storage	
5. Drillhole Dimensions and Construction Method				8. Geology			
From To Upper Lower				Type, Caving/Noncaving, Color, Hardness, etc			
Dia (in.) (ft.) (ft.) Enlarged Drillhole				From To (ft.) (ft.)			
10 0 44 <input checked="" type="checkbox"/> ---1. Rotary - Mud Circulation----- <input checked="" type="checkbox"/>				--Z-- GRAVEL & CLAY 0 15			
<input type="checkbox"/> ---2. Rotary - Air----- <input type="checkbox"/>				--L-- LIMESTONE 15 145			
6 44 145 <input type="checkbox"/> ---3. Rotary - Air and Foam----- <input type="checkbox"/>							
<input type="checkbox"/> ---4. Drill-Through Casing Hammer							
<input type="checkbox"/> ---5. Reverse Rotary							
<input type="checkbox"/> ---6. Cable-tool Bit in. dia----- <input type="checkbox"/>							
<input type="checkbox"/> 7. Dual Rotary <input type="checkbox"/>							
<input type="checkbox"/> 8. Temp. Outer Casing in. dia. depth (ft)							
Removed? <input type="checkbox"/> Yes <input type="checkbox"/> No							
If no, why not?							
6. Casing, Liner, Screen Material, Weight, Specification From To							
Dia. (in.) (ft.) (ft.)							
6 18.97 LBS. PER FT. NEW STEEL PLAIN END 0 44							
ASTM A53 GRADE B SAWHILL 2660 PSI							
9. Static Water Level				11. Well is:			
ft. above ground surface				<input checked="" type="checkbox"/> Above Grade			
37 ft. below ground surface				12 in. <input type="checkbox"/> Below Grade			
10. Pump Test				Developed? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
Pumping Level 80 ft. below surface				Disinfected? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
Pumping at 20 GPM for 3 hours				Capped? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
7. Grout or Other Sealing Material. Method				12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property?			
Method: BRADENHEAD From To # Sacks				<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If no, explain: NONE			
Kind of Sealing Material (ft.) (ft.) Cement							
NEAT CEMENT GROUT 0 44 14				13. Signature of the Well Constructor or Supervisory Driller			
				LJH 12/18/2001			
				Signature of Drill Rig Operator (Mandatory unless same as above)			
				SK 12/18/2001			
Make additional comments on reverse side about geology, additional screens, water quality, etc.				Variance issued <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			

Well Construction Report For
WISCONSIN UNIQUE WELL NUMBER QQ262

State of WI - Private Water Systems - DG/2
Department of Natural Resources, Box 7921
Madison, WI 53707

Form 3300-77A
(R 8/00)

Property Owner		Telephone Number	
Mailing Address			
City	State	Zip Code	
County of Well Location	County Well Permit No.	Well Completion Date	
Waukesha	W	12/14/2001	

1. Well Location	Fire # (if available)
<input type="checkbox"/> Town <input checked="" type="checkbox"/> City <input type="checkbox"/> Village	
of NEW BERLIN	

Grid or Street Address or Road Name and Number

Subdivision Name	Lot #	Block #
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Well Constructor (Business Name)	License #	Facility ID Number (Public Wells)
HERR WELL DRILLING INC	672	
Address		Public Well Plan Approval #
W295 HERR RD		W--
City	State	Zip Code
DOUSMAN	WI	53118-9407
Date of Approval (mm/dd/yyyy)		
Hicap Permanent well #	Common Well #	Specific Capacity
		.7 gpm/ft

Gov't Lot #	or	NW	1/4 of	SW	1/4 of
Section 28	T	6 N; R 20	<input checked="" type="checkbox"/> E	<input type="checkbox"/> W	
Latitude	Deg.	Min.			
Longitude	Deg.	Min.			

2. Well Type	<input checked="" type="checkbox"/> New	Lat/Long Method
<input type="checkbox"/> Replacement	<input type="checkbox"/> Reconstruction	GPS008
of previous unique well # constructed in		
Reason for replaced or Reconstructed Well?		

3. Well serves	1 # of homes and or	High capacity Well?
(e.g. barn, restaurant, church, school, industry, etc.)		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
		Property?
		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

4. Is the well located upslope or sideslope and not downslope from any contamination source, including those on neighboring properties?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Well located within 1,200 feet of a quarry? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, distance in feet from quarry:		
Well located in floodplain? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Distance in Feet from Well to Nearest:		
1. Landfill	9. Downspout/Yard Hydrant	
19 2. Building Overhang	10. Privy	
60 3. Septic <input checked="" type="checkbox"/> Holding Tank <input type="checkbox"/>	11. Foundation Drain to Clearwater	
90 4. Sewage Absorption Unit	12. Foundation Drain to Sewer	
5. Nonconforming Pit	13. Building Drain	
6. Buried Home Heating Oil Tank	<input type="checkbox"/> Cast Iron or Plastic <input type="checkbox"/> Other	
7. Buried Petroleum Tank	14. Building Sewer <input type="checkbox"/> Gravity <input type="checkbox"/> Pressure	
	<input type="checkbox"/> Cast Iron or Plastic <input type="checkbox"/> Other	
	15. Collector or Street Sewer:	
	<input type="checkbox"/> Sanitary units in. diam.	
	<input type="checkbox"/> Storm <input type="checkbox"/> =< 6 <input type="checkbox"/> > 6	
8. Shoreline <input type="checkbox"/> Swimming Pool <input type="checkbox"/>	16. Clearwater Sump	

- 17. Wastewater Sump
- 18. Paved Animal Barn Pen
- 19. Animal Yard or Shelter
- 20. Silo
- 21. Barn Gutter
- 22. Manure Pipe ☐ Gravity ☐ Pressure
- ☐ Cast Iron or Plastic ☐ Other
- 23. Other Manure Storage
- 24. Ditch

5. Drillhole Dimensions and Construction Method			Lower
From	To	Upper	Open Bedrock
Dia (in.)	(ft.)	(ft.)	
10	0	45	<input checked="" type="checkbox"/> ---1. Rotary - Mud Circulation----- <input checked="" type="checkbox"/>
			<input type="checkbox"/> ---2. Rotary - Air----- <input type="checkbox"/>
6	45	145	<input type="checkbox"/> ---3. Rotary - Air and Foam----- <input type="checkbox"/>
			<input type="checkbox"/> ---4. Drill-Through Casing Hammer
			<input type="checkbox"/> ---5. Reverse Rotary
			<input type="checkbox"/> ---6. Cable-tool Bit in. dia----- <input type="checkbox"/>
			<input type="checkbox"/> 7. Dual Rotary <input type="checkbox"/>
			<input type="checkbox"/> 8. Temp. Outer Casing in. dia. depth (ft)
			Removed? <input type="checkbox"/> Yes <input type="checkbox"/> No
			If no, why not?

8.	Geology	From (ft.)	To (ft.)
	Type, Caving/Noncaving, Color, Hardness, etc		
--Z-	GRAVEL & CLAY	0	15
--L-	LIMESTONE	15	50
-BL-	BROKEN LIMESTONE	50	63
--L-	LIMESTONE	63	145

6. Casing, Liner, Screen	Material, Weight, Specification	From (ft.)	To (ft.)
Dia. (in.)			
6	18.97#/FT NEW STEEL PLAINEND ASTM A53 GR.B SAWHILL 2660 PSI	0	45
	5 LINER PIPE INSTALLED ASTM A53 GR.B PLAIN END ERW IPSCO TUBULAR W/4 K-	20	63
Dia. (in.)	Screen type, material & slot size		

9. Static Water Level	11. Well is:
ft. above ground surface	<input checked="" type="checkbox"/> Above Grade
30 ft. below ground surface	12 in. <input type="checkbox"/> Below Grade
10. Pump Test	Developed? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Pumping Level 60 ft. below surface	Disinfected? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Pumping at 20 GPM for 2 hours	Capped? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

7. Grout or Other Sealing Material. Method:	From (ft.)	To (ft.)	# Sacks Cement
BRADEN HEAD			
Kind of Sealing Material			
NEAT CEMENT GROUT	0	45	14

12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property?	Date signed
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If no, explain: NONE	12/27/2001
13. Signature of the Well Constructor or Supervisory Driller	Date signed
JH	12/27/2001
Signature of Drill Rig Operator (Mandatory unless same as above)	Date signed
SK	12/27/2001

Make additional comments on reverse side about geology, additional screens, water quality, etc.

Variance issued ☐ Yes ☒ No

Well Construction Report For WISCONSIN UNIQUE WELL NUMBER QQ264				State of WI - Private Water Systems - DG/2 Department of Natural Resources, Box 7921 Madison, WI 53707 Please type or Print using a black Pen Please Use Decimals Instead of Fractions.				Form 3300-77A (R 8/00)			
Property Owner				Telephone -- Number							
Mailing Address								1. Well Location <input type="checkbox"/> Town <input checked="" type="checkbox"/> City <input type="checkbox"/> Village of NEW BERLIN			
City				State		Zip Code		Grid or Street Address or Road Name and Number			
County of Well Location Waukesha				County Well Permit No. W		Well Completion Date 12/12/2001		Subdivision Name Lot # Block #			
Well Constructor (Business Name) HERR WELL DRILLING INC				License # 672		Facility ID Number (Public Wells)		Gov't Lot # or NW 1/4 of SW 1/4 of			
Address W295 HERR RD				Public Well Plan Approval # W--				Section 28 T 6 N; R 20 <input checked="" type="checkbox"/> E <input type="checkbox"/> W			
City DOUSMAN				State WI		Zip Code 53118-9407		Latitude Deg. Min. Longitude Deg. Min.			
Hicap Permanent well #				Common Well #		Specific Capacity .6 gpm/ft		2. Well Type <input checked="" type="checkbox"/> New <input type="checkbox"/> Replacement <input type="checkbox"/> Reconstruction Lat/Long Method GPS008			
3. Well serves 1 # of homes and or (e.g. barn, restaurant, church, school, industry, etc.)				High capacity Well? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Property? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input checked="" type="checkbox"/> Drilled <input type="checkbox"/> Driven Point <input type="checkbox"/> Jetted <input type="checkbox"/> Other:			
4. Is the well located upslope or sideslope and not downslope from any contamination source, including those on neighboring properties? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No											
Well located within 1,200 feet of a quarry? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, distance in feet from quarry:											
Well located in floodplain? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No											
Distance in Feet from Well to Nearest:											
1. Landfill											
17 2. Building Overhang											
60 3. Septic <input checked="" type="checkbox"/> Holding Tank <input type="checkbox"/>											
90 4. Sewage Absorption Unit											
5. Nonconforming Pit											
6. Buried Home Heating Oil Tank											
7. Buried Petroleum Tank											
8. Shoreline <input type="checkbox"/> Swimming Pool <input type="checkbox"/>											
9. Downspout/Yard Hydrant											
10. Privy											
11. Foundation Drain to Clearwater											
12. Foundation Drain to Sewer											
13. Building Drain											
<input type="checkbox"/> Cast Iron or Plastic <input type="checkbox"/> Other											
14. Building Sewer <input type="checkbox"/> Gravity <input type="checkbox"/> Pressure											
<input type="checkbox"/> Cast Iron or Plastic <input type="checkbox"/> Other											
15. Collector or Street Sewer:											
<input type="checkbox"/> Sanitary units in. diam.											
<input type="checkbox"/> Storm <input type="checkbox"/> =< 6 <input type="checkbox"/> > 6											
16. Clearwater Sump											
17. Wastewater Sump											
18. Paved Animal Barn Pen											
19. Animal Yard or Shelter											
20. Silo											
21. Barn Gutter											
22. Manure Pipe <input type="checkbox"/> Gravity <input type="checkbox"/> Pressure											
<input type="checkbox"/> Cast Iron or Plastic <input type="checkbox"/> Other											
23. Other Manure Storage											
24. Ditch											
25. Other NR 812 Waste Storage											
5. Drillhole Dimensions and Construction Method											
From To Upper Lower											
Dia (in.) (ft.) (ft.) Enlarged Drillhole											
10 0 44 <input checked="" type="checkbox"/> ---1. Rotary - Mud Circulation----- <input checked="" type="checkbox"/>											
<input type="checkbox"/> ---2. Rotary - Air----- <input type="checkbox"/>											
<input type="checkbox"/> ---3. Rotary - Air and Foam----- <input type="checkbox"/>											
<input type="checkbox"/> ---4. Drill-Through Casing Hammer											
<input type="checkbox"/> ---5. Reverse Rotary											
<input type="checkbox"/> ---6. Cable-tool Bit in. dia----- <input type="checkbox"/>											
<input type="checkbox"/> 7. Dual Rotary <input type="checkbox"/>											
<input type="checkbox"/> 8. Temp. Outer Casing in. dia. depth (ft)											
Removed? <input type="checkbox"/> Yes <input type="checkbox"/> No											
If no, why not?											
6. Casing, Liner, Screen Material, Weight, Specification From To											
Dia. (in.) (ft.) (ft.)											
6 18.97#/FT NEW STEEL PLAINEND ASTM A53 0 44											
GR.B SAWHILL 2660 PSI											
Dia. (in.) Screen type, material & slot size											
7. Grout or Other Sealing Material. Method From To # Sacks											
Method: BRADEN HEAD (ft.) (ft.) Cement											
Kind of Sealing Material											
NEAT CEMENT GROUT 0 44 14											
8. Static Water Level ft. above ground surface											
24 ft. below ground surface											
11. Well is: <input checked="" type="checkbox"/> Above Grade											
12 in. <input type="checkbox"/> Below Grade											
Developed? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No											
Disinfected? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No											
Capped? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No											
10. Pump Test Pumping Level 60 ft. below surface											
Pumping at 20 GPM for 3 hours											
12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If no, explain: NONE											
13. Signature of the Well Constructor or Supervisory Driller Date signed											
JH 12/20/2001											
Signature of Drill Rig Operator (Mandatory unless same as above) Date signed											
SK 01/16/2002											
Make additional comments on reverse side about geology, additional screens, water quality, etc.											
Variance issued <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No											

Well Construction Report For WISCONSIN UNIQUE WELL NUMBER QQ265				State of WI - Private Water Systems - DG/2 Department of Natural Resources, Box 7921 Madison, WI 53707 Please type or Print using a black Pen Please Use Decimals Instead of Fractions.		Form 3300-77A (R 8/00)	
Property Owner			Telephone Number				
Mailing Address						1. Well Location	
City			State		Zip Code		Fire # (if available)
County of Well Location			County Well Permit No.		Well Completion Date		
Waukesha			W		12/17/2001		
Well Constructor (Business Name)			License #		Facility ID Number (Public Wells)		
HERR WELL DRILLING INC			672				
Address			Public Well Plan Approval #		Gov't Lot #		or NW 1/4 of SW 1/4 of
W295 HERR RD			W--		Section 28 T 6 N; R 20		<input checked="" type="checkbox"/> E <input type="checkbox"/> W
City			State		Zip Code		Latitude Deg. Min.
DOUSMAN			WI		53118-9407		Longitude Deg. Min.
Hicap Permanent well #			Common Well #		Specific Capacity		2. Well Type
					.3 gpm/ft		<input checked="" type="checkbox"/> New <input type="checkbox"/> Replacement <input type="checkbox"/> Reconstruction
3. Well serves			1 # of homes and or		High capacity Well?		Lat/Long Method
(e.g. barn, restaurant, church, school, industry, etc.)					<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		GPS008
4. Is the well located upslope or sideslope and not downslope from any contamination source, including those on neighboring properties?					<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Well located within 1,200 feet of a quarry?			<input type="checkbox"/> Yes <input type="checkbox"/> No		If yes, distance in feet from quarry:		
Well located in floodplain?			<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Distance in Feet from Well to Nearest:		
1. Landfill					9. Downspout/Yard Hydrant		17. Wastewater Sump
15 2. Building Overhang					10. Privy		18. Paved Animal Barn Pen
31 3. Septic <input checked="" type="checkbox"/> Holding Tank <input type="checkbox"/>					11. Foundation Drain to Clearwater		19. Animal Yard or Shelter
52 4. Sewage Absorption Unit					12. Foundation Drain to Sewer		20. Silo
5. Nonconforming Pit					13. Building Drain		21. Barn Gutter
6. Buried Home Heating Oil Tank					<input type="checkbox"/> Cast Iron or Plastic <input type="checkbox"/> Other		22. Manure Pipe <input type="checkbox"/> Gravity <input type="checkbox"/> Pressure
7. Buried Petroleum Tank					14. Building Sewer <input type="checkbox"/> Gravity <input type="checkbox"/> Pressure		<input type="checkbox"/> Cast Iron or Plastic <input type="checkbox"/> Other
					15. Collector or Street Sewer:		23. Other Manure Storage
					<input type="checkbox"/> Sanitary units in. diam.		24. Ditch
8. Shoreline <input type="checkbox"/> Swimming Pool <input type="checkbox"/>					<input type="checkbox"/> Storm <input type="checkbox"/> =< 6 <input type="checkbox"/> > 6		25. Other NR 812 Waste Storage
5. Drillhole Dimensions and Construction Method					8. Geology		From To
Dia (in.) From (ft.) To (ft.) Upper Enlarged Drillhole					Type, Caving/Noncaving, Color, Hardness, etc		(ft.) (ft.)
10 0 45 <input checked="" type="checkbox"/> ---1. Rotary - Mud Circulation----- <input checked="" type="checkbox"/>					--Z-- GRAVEL & CLAY		0 15
6 45 145 <input type="checkbox"/> ---2. Rotary - Air----- <input type="checkbox"/>					--L-- LIMESTONE		15 145
<input type="checkbox"/> ---3. Rotary - Air and Foam----- <input type="checkbox"/>							
<input type="checkbox"/> ---4. Drill-Through Casing Hammer							
<input type="checkbox"/> ---5. Reverse Rotary							
<input type="checkbox"/> ---6. Cable-tool Bit in. dia----- <input type="checkbox"/>							
<input type="checkbox"/> 7. Dual Rotary <input type="checkbox"/>							
<input type="checkbox"/> 8. Temp. Outer Casing in. dia. depth (ft)							
Removed? <input type="checkbox"/> Yes <input type="checkbox"/> No							
If no, why not?							
6. Casing, Liner, Screen Material, Weight, Specification			From To				
Dia. (in.)			(ft.) (ft.)				
6 18.97 LBS PER FOOT NEW STEEL PLAIN			0 45				
END ASTM A53 GRADE B SAWHILL 2660							
PSI							
Dia. (in.)			Screen type, material & slot size		9. Static Water Level		11. Well is:
					ft. above ground surface		<input checked="" type="checkbox"/> Above Grade
					19 ft. below ground surface		<input type="checkbox"/> Below Grade
					10. Pump Test		Developed? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
					Pumping Level 80 ft. below surface		Disinfected? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
					Pumping at 20 GPM for 3 hours		Capped? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
7. Grout or Other Sealing Material. Method			From To # Sacks		12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property?		
Method: BRADEN HEAD			(ft.) (ft.) Cement		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If no, explain: NONE		
Kind of Sealing Material							
NEAT CEMENT GROUT			0 45 15		13. Signature of the Well Constructor or Supervisory Driller		Date signed
					JH		01/02/2002
					Signature of Drill Rig Operator (Mandatory unless same as above)		Date signed
					DRJ		01/02/2002
Make additional comments on reverse side about geology, additional screens, water quality, etc.			Variance issued <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				

(SE NWSW) T6N R20E Sec 28

WK20146 Vol 6

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH
See Instructions on Reverse Side

RECEIVED

1. County Waukesha Town ☐ New Berlin
 Village ☐ City ☒ Check one NOV 18 1963

2. Location Lot 112- Prospect Heights SE, NW, SW, Sec 28
 Name of street and number of premise or Section, Town and Range numbers

3. Owner ☐ or Agent ☒ Tomsinger Construction CO. SANITARY
 Name of individual, partnership or firm ENGINEERING

4. Mail Address 7607 W. State Street
 Complete address required

5. From well to nearest: Building 15 ft; sewer ft; drain ft; septic tank 51 ft;
dry well or filter bed ft; abandoned well ft. New Well

6. Well is intended to supply water for: Home

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	0	42	7	42	76

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
7	Black steel	0	42
	Iron Pipe		
	26#		

9. GROUT:

Kind	From (ft.)	To (ft.)
Drilled Mud	0	20
Cement	20	42

11. MISCELLANEOUS DATA:

Yield test: 8 Hrs. at 10 GPM.
Depth from surface to water-level: 25 ft.
Water-level when pumping: 45 ft.
Water sample was sent to the state laboratory at:
Madison on July 6 1961
City

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Clay (red)	0	16
Gravel (coarse)	16	20
Limestone (water)	20	42
Limestone (water)	42	76

Construction of the well was completed on:

7/6/ 1961

The well is terminated 8 inches
☒ above, below ☐ the permanent ground surface.

Was the well disinfected upon completion?

Yes ☒ No ☐

Was the well sealed watertight upon completion?

Yes ☐ No ☐

Signature

[Redacted Signature]

S59 W22816 Glengarry Rd.-Waukesha, Wis.
Complete Mail Address

Please do not write in space below

Rec'd No.

Ans'd

Interpretation



W K 2 0 1 4 6

10 ml 10 ml 10 ml 10 ml 10 ml

Gas—24 hrs.

48 hrs.

Confirm

B. Coli

Examiner

NE, NW, SW,

T6N R20E SEC 28

WK20150

Wel. 6-30M (6-50)

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

See Instructions on Reverse Side

NE, NW, SW, Sec. 28

1. County

Waushara

Town ☒ Village ☐

New Berlin

Check one and give name

RECEIVED
JUN 5 1952
ENVIRONMENTAL
SANITATION

2. Location

3. Owner ☒

4. Mail Address

Complete address required

5. From well to nearest: Building 15 ft; sewer 75 ft; drain ft; septic tank 60 ft;

dry well or filter bed ft; abandoned well ft.

6. Well is intended to supply water for: Home

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6	0	86			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	Standard Weight Black Std Pipe	0	26

9. GROUT:

Kind	From (ft.)	To (ft.)
Red clay slurry	0	26

11. MISCELLANEOUS DATA:

Yield test: 24 Hrs. at 20 GPM.

Depth from surface to water-level: 6 ft.

Water-level when pumping: 12 ft.

Water sample was sent to the state laboratory at:

Madison on May 26 1952
City

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Gravel	0	5
Broken rock	5	26
Limerock dense	26	76
Limerock dense (waterbearing)	76	86

Construction of the well was completed on:

May 22 1952

The well is terminated 6 inches
☒ above, below ☐ the permanent ground surface.

Was the well disinfected upon completion?

Yes No ☒

Was the well sealed watertight upon completion?

Yes ☒ No

Signature

R3, Box 89, Waushara, Wis.
Complete Mail Address

do not write in space below

Rec'd MAY 29 1952 No. 7117

Ans'd

Interpretation Safe

Gas—24 hrs.

48 hrs.

Confirm

B. Coli

10 ml 10 ml 10 ml 10 ml 10 ml

0 0 0 0 0

0 0 0 0 0

0 0 0 0 0

0 0 0 0 0

Examiner



W K 2 0 1 5 0

Please send original with no more

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

See Instructions on Reverse Side

1. County WausharaTown ☒ Village ☐New Berlin2. Location SW 1 NE 1

5235 S Br

3. Owner ☒ or

4. Mail Address

5. From well to nearest: Building 15 ft; sewer 50 ft; drain 15 ft; septic tank 52 ft;
dry well or filter bed 75 ft; abandoned well _____ ft.

6. Well is intended to supply water for: Home

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	0	42			
6	42	101			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	Standard Weight Black Steel Pipes	0	42

9. GROUT:

Kind	From (ft.)	To (ft.)
5 bags Cement 40 gal water	0	42

11. MISCELLANEOUS DATA:

Yield test: 20 Hrs. at 15 GPM.Depth from surface to water-level: 26 ft.Water-level when pumping: 30 ft.

Water sample was sent to the state laboratory at:

Madison on July-9- 1956
City

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Red clay	0	6
yellow clay	6	12
Broken rock	12	18
Limerock dense	18	65
Limerock dense (waterbearing)	65	101

Construction of the well was completed on:

July-3- 1956The well is terminated 8 inches
☒ above, below ☐ the permanent ground surface.

Was the well disinfected upon completion?

Yes ☒ No _____

Was the well sealed watertight upon completion?

Yes ☒ No _____

Signature

R3, Box 112, Waushara, Wisc
Complete Mail Address

Please do not write in space below

Rec'd

JUL 10 1956

No. 22624

Ans'd

Interpretation



W K 2 0 1 5 2

UNSAFE

Gas—24 hrs.

48 hrs.

Confirm

B. Coli

Examiner

T6N R20E SEC 28 SW NE, SW

WK20153

Wel. 6-30M (6-50)

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

SW, NE, SW, Sec. 28

See Instructions on Reverse Side

RECEIVED

1. County Waukesha

Town ☒ Village ☐ City ☐

Waukesha 1954

Check one and give name

2. Location Prospect Heights Subd House #119

Name of street and number of premise or Section, Town and Range numbers

3. Owner ☒ or Agent ☐ John M. Brennan Const Co

Name of individual, partnership or firm

4. Mail Address R6, Waukesha, Wis.

Complete address required

5. From well to nearest: Building 15 ft; sewer 70 ft; drain 60 ft; septic tank 55 ft;

dry well or filter bed 120 ft; abandoned well _____ ft.

6. Well is intended to supply water for: Home

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	0	42			
6	42	105			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	Standard Weight	0	42
	Black Steel Pipe		

9. GROUT:

Kind	From (ft.)	To (ft.)
5 gal water to 1 bag early setting cement	0	42

11. MISCELLANEOUS DATA:

Yield test: 24 Hrs. at 9 GPM.

Depth from surface to water-level: 28 ft.

Water-level when pumping: 33 ft.

Water sample was sent to the state laboratory at:

Malison on Feb-1- 1954

City

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Clay	1	3
Gravel	3	9
Broken rock	9	14
Limerock dense	14	42
Limerock dense	42	65
Limerock dense (waterbearing)	65	105

Construction of the well was completed on:

Jan-27- 1954

The well is terminated 8 inches ☒ above, below ☐ the permanent ground surface.

Was the well disinfected upon completion?

Yes ☒ No ☐

Was the well sealed watertight upon completion?

Yes ☒ No ☐

Signature

[Redacted Signature]

R. Boy 112 Waukesha, Wis.

Complete Mail Address

Please do not write in space below

Rec'd FEB 2, 1954 No. 1334

Ans'd _____

Interpretation UNSAFE



W K 2 0 1 5 3

SEE OTHER SIDE

10 ml 10 ml 10 ml 10 ml 10 ml

Gas—24 hrs. 0

48 hrs. + + + + +

Confirm _____

B. Coli _____

5/5

Examiner _____

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

SW, NE, SW, Sec. 28, T6N, R20E See Instructions on Reverse Side

1. County Waukesha Town ☒ New Berlin
 Village ☐ City ☐ Check one and give name
 2. Location Brennan Ave Prospect Heights Subd
 Name of street and number of premise or Section, Town and Range numbers
 3. Owner ☒ or Agent ☐ John M Brennan Const Co
 Name of individual, partnership or firm
 4. Mail Address Rt 6, Waukesha, Wisc
 Complete address required
 5. From well to nearest: Building 15 ft; sewer 60 ft; drain 60 ft; septic tank 55 ft;
 dry well or filter bed 100 ft; abandoned well _____ ft.

6. Well is intended to supply water for: Home

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	0	40			
6	40	116			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	Standard Weight Black Steel Pipe	0	40

9. GROUT:

Kind	From (ft.)	To (ft.)
Neat Cement	0	40

11. MISCELLANEOUS DATA:

Yield test: 24 Hrs. at 10 GPM.

Depth from surface to water-level: 20 ft.

Water-level when pumping: 30 ft.

Water sample was sent to the state laboratory at:

Madison on Mar-9-1954
 City

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Red clay	0	8
Shovel	8	20
Limerock dense	20	65
Limerock dense (water bearing)	65	116

Construction of the well was completed on:

Mar-7-1954

The well is terminated 8 inches
☒ above, below ☐ the permanent ground surface.

Was the well disinfected upon completion?

Yes ☒ No ☐

Was the well sealed watertight upon completion?

Yes ☒ No ☐

Signature _____

R3 Box 112, Waukesha, Wisc
 Complete Mail Address

Please do not write in space below

Rec'd MAR 11 1954 No. 4807

Ans'd _____

Interpretation SAFE



SEE OTHER SIDE

10 ml 10 ml 10 ml 10 ml 10 ml

Gas—24 hrs. 0

48 hrs. 0

Confirm _____

B. Coli 0/5

Examiner _____

House #20, Lot #20

WK20189

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
Box 450
Madison, Wisconsin 53701

NOTE

WHITE COPY - DIVISION'S COPY
GREEN COPY - DRILLER'S COPY
YELLOW COPY - OWNER'S COPY

1. COUNTY		CHECK ONE		NAME				
WAUKESHA		<input type="checkbox"/> Town	<input type="checkbox"/> Village	<input checked="" type="checkbox"/> City NEW BERLIN				
2 LOCATION - 1/4 Section		Section	Township	3 OWNER AT TIME OF DRILLING				
W 1/2 SE 1/4		28	T6N R20E	WOLTER BROS. BUILDERS				
OR - Grid or street no		Street name		ADDRESS				
		KILLIAM'S RD.		6019 W. HOWARD AVE				
AND - If available subdivision name, lot & block no				POST OFFICE				
ORCHARD KNOLL LOT 10				MILWAUKEE				
4. Distance in feet from well to nearest		BUILDING	SANITARY SEWER	FLOOR DRAIN	FOUNDATION DRAIN	WASTE WATER DRAIN		
(Record answer in appropriate block)		C I	TILE	C I	TILE	C I		
		15	45 -	40 -	30	50 -		
CLEAR WATER DRAIN	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
C. I.	TILE							
-	20	60	-	85	-	-	-	-
OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc)								

5. Well is intended to supply water for:

Home

6. DRILLHOLE						9. FORMATIONS		
Dia (in)	From (ft)	To (ft)	Dia (in)	From (ft)	To (ft)	Kind	From (ft)	To (ft)
8	Surface	42	6	42	152	CLAY	Surface	15
						GRAVEL	13	20
						LIMESTONE	20	152
7. CASING, LINER, CURBING, AND SCREEN								
Dia (in)	Kind and Weight		From (ft)	To (ft)				
6 New	STEEL, BLK,		Surface	42				
	WELDED, 0.280							
	WELDED, 0.280							
	ASTM-A53-APR							
	ASTM-A53-APR							
	JAPAN-IMPORTED.							
8. GROUT OR OTHER SEALING MATERIAL						10. TYPE OF DRILLING MACHINE USED		
Kind			From (ft)	To (ft)		<input checked="" type="checkbox"/> Cable Tool <input type="checkbox"/> Direct Rotary <input type="checkbox"/> Reverse Rotary <input type="checkbox"/> Rotary - air w/drilling mud <input type="checkbox"/> Rotary - hammer with drilling mud & air <input type="checkbox"/> Jetting with <input type="checkbox"/> Air <input type="checkbox"/> Water		
CLAY SLURRY			Surface	3		Well construction completed on NOV 28 1975		
CEMENT			3	42				
11. MISCELLANEOUS DATA						Well is terminated 8 inches <input checked="" type="checkbox"/> above <input type="checkbox"/> below final grade		
Yield test:	8	Hrs. at	10	GPM		Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Depth from surface to normal water level			25	ft.		Well sealed watertight upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Depth to water level when pumping			35	ft.				
Water sample sent to MADISON, WIS						laboratory on. Dec 1 1976		

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumprooms, access pits, etc., should be given on reverse side

SIGNATURE

COMPLETE MAIL ADDRESS

Registered Well Driller

in space below

5 - 48 HRS

CONFIRMED

REMARKS

SW, SE, NW, T6N R20E SEC 28

WK20273

Wel. 6-30M (6-50)

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

SW, SE, NW, Sec. 28

See Instructions on Reverse Side

1. County

Waushara

Town

Village

New Berlin

Check one and give name

2. Location

3. Owner ☒ or Agent ☐

4. Mail Address

R 6,

5. From well to nearest: Building 16 ft; sewer 60 ft; drain 60 ft; septic tank 50 ft;

dry well or filter bed 100 ft; abandoned well ft.

6. Well is intended to supply water for: Home

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	0	40			
6	40	93			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	Standard Weight Black Steel Pipe	0	40

9. GROUT:

Kind	From (ft.)	To (ft.)
Red clay slurry	0	40

11. MISCELLANEOUS DATA:

Yield test: 24 Hrs. at 15 GPM.

Depth from surface to water-level: 25 ft.

Water-level when pumping: 30 ft.

Water sample was sent to the state laboratory at:

Madison on May-10-1954

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Red clay	0	18
Clay Broken limestone	18	30
Limestone dense	30	70
Sandstone (waterbearing)	70	93

Construction of the well was completed on:

May-7-1954

The well is terminated 8 inches
☒ above, below ☐ the permanent ground surface.

Was the well disinfected upon completion?

Yes ☒ No ☐

Was the well sealed watertight upon completion?

Yes ☒ No ☐

Signature

Registered Well Driller

Please do not write in space below

R3, Box 112, Waushara, Wis.

Complete Mail Address

Rec'd MAY 11 1954

No. 9775

Ans'd

Interpretation

SAFE

SEE OTHER SIDE



Gas—24 hrs.

48 hrs.

Confirm

B. Coli

Examiner

Please read and seal carefully. This well is to be drilled to a depth of 100 feet. The water level is 25 feet below the surface. The water level when pumping is 30 feet. The water sample was sent to the state laboratory at Madison on May-10-1954. The well is terminated 8 inches above the permanent ground surface. The well was disinfected upon completion. The well was sealed watertight upon completion.



Appendix B-14 – MMSD Soil Borings Near Route Alternatives





MILWAUKEE TESTING LABORATORY, INC.

2135 SOUTH 116TH STREET
MILWAUKEE, WISCONSIN 53227
TELEPHONE: 321-0100

Log of Boring No. 14

Sheet 1 of 1

Project CONTRACT 234

Reported to: Metropolitan Sewerage Commission, P.O. Box 2079, Milwaukee, Wisconsin 53201

Drive Split O.D. 2 " Wt. 140 # fall 30 " Location: Station 70+22 Offset 20' West
Sample Spoon O.D. 2 " Wt. 140 # fall 30 " Existing Surface on Date of Boring or Ground E.: 145.0

Ground Water Observations

Date 5/20/70 Time After Boring Depth 6 1/2' below surface
Party R. St. Denis Date: Start 5/20/70
R. Rouse Finish 5/20/70

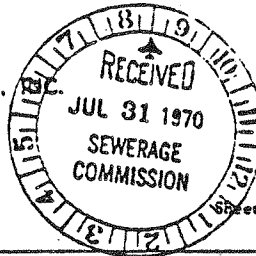
Moisture: Dry; D = Damp; M = Moist; W = Wet Truck No. 2 Rig CME

Sample No.	Moisture	PL-S LL-%	Blows on Sampler per Foot	CLASSIFICATION AND REMARKS	Recommended Maximum Allowable Bearing Value in Lb. or Sq. Ft.	Depth in Feet	Elevation	Jackpot, Sur. Ton Field Test	Jackpot, Sur. Ton Lab. Test	Dr. Pipe Blows
				Fill - loose brown fine to medium sand with silty clay. Moist		0				
1	M		13	Firm brown fine to medium SAND-silty, with small to large gravel, trace of clay. Moist	4000	5	140.0			
2	W		5	Loose brown fine to coarse SAND- silty, with scattered small gravel. Wet	2500	10	135.0			
3	W		63	Very dense brown gray fine to coarse SAND-silty, with small to large gravel. Wet	10,000	15	130.0			
4	W		97		10,000+	20	125.0			
5	W		100 1/2	Weathered Limestone-seams of fine to medium sand.	10,000+	25	120.0			
6	W		46	Dense gray fine to coarse SAND- silty, with large gravel. Wet	10,000	30	115.0			
7	M		39	Hard gray CLAY-silty and sandy, trace of small gravel. Moist	8000	35	110.0	4.5+		
8	W		50	Dense gray fine to coarse SAND-silty with gravel. Wet	10,000	40	105.0			
				Limestone-thin seams of sand.	10,000+					
				END OF BORING: 43.0'		45				



MILWAUKEE TESTING LABORATORY, INC.

2135 SOUTH 116TH STREET
MILWAUKEE, WISCONSIN 53227
TELEPHONE: 321-0100



Log of Boring No. 1

Project CONTRACT 241

Reported to: Metropolitan Sewerage Commission, P.O. Box 2079, Milwaukee, Wisconsin

Drive Pipe: O.D. " Wt. " fall " Location: Station 5+00—offset 15' East

Sampler Split Spoon O.D. 2" Wt. 140" fall 30" Existing Surface on Date of Boring or Ground El: 144.8

Ground Water Observations

Date 7/27/70 Time Depth Remarks After boring 3 1/2' below surface

Moisture: Dry; D = Damp; M = Moist; W = Wet

Party

Date: Start 7/27/70

R. St Denis

Finish 7/27/70

R. Rouse

Truck No. 2 Rig CME

Sample No.	Moisture	PL-% LL-%	Blows on Sampler per Foot	CLASSIFICATION AND REMARKS	Recommended Maximum Allowable Bearing Value in Lb. or Sq. Ft.	Depth in Feet	Elevation	Uncorr. St. 10s Field Penet.	Uncorr. St. Lb. per Sq. Ft.	Lab. Test	Dr. Pipe Blows
				Topsoil		0					
				Firm brown fine to medium SAND - silty, trace of clay.	3,000	1					
1	W		26	(Moist)				139.8			
				Firm brown fine to medium SAND - silty, scattered small to large gravel, scattered thin seams of clay.	5,000	2					
2	W		23		5,000	10		134.8			
				(Wet)							
3	W		5	Loose gray Silt - sandy, many seams of coarse sand, scattered gravel, scattered thin seams of silty clay.	1,000	15		129.8			
				(Wet)							
				Firm grey fine to coarse SAND - silty with small to large gravel, cobbles and boulders.	10,000+	20		124.8			
				(Wet)							
				Limestone - scattered seams of coarse sand with small gravel.	10,000+	25		119.8			
				(Seams Wet)		30		114.8			
				END OF BORING: 30'		35					

BORING LOG OF TEST HOLE NO. B8

PROJECT MCCARTY PARK - MIS RELIEF SEWER LOCATION West Allis, Wisconsin
 SURFACE ELEVATION 151.61 JOB NO. 8798 CLIENT MILWAUKEE METROPOLITAN SEWERAGE DISTRICT
 BENCHMARK OR DATUM MMSD Datum COORDINATES: (N) 366615.3373 (E) 2532604.3431

DEPTH	SAMPLE DEPTH RECOVERY	SOIL DESCRIPTION - PRIMARY SOIL, consistency/density, moisture, color, secondary soil types. Remarks.	SYM.	UNIFIED CLASSIF.	N	PP (TSF)	q_u	LL PL PI	γ_m γ_d w %	OTHER LAB. TESTS
Feet	0'	SURFACE								00
	GRAB-1 18"	TOPSOIL - CLAYEY SILT CLAYEY SAND - saturated, brown, possibly fill	1'	cl-ml						
			4'	sc					18.2	
5	SS-1 5"	CLAYEY SILT - medium stiff, moist, dark brown, organic matter noted	7'	cl-ml	6	0.7 1.0 0.5			19.8	
	SS-2 10"	SILTY CLAY - stiff to very stiff, moist, grey brown, little to some sand, trace gravel			21	2.2 3.5 3.5			15.0	
15	SS-3 11"				22	2.7 2.7 3.5			15.9	
20	SS-4 15"			CL	14	2.2 1.7 2.2			16.9	
25	SS-5 15"				13	2.5 1.7 1.5			17.1	
BORING CONTINUED ON NEXT PAGE										

GROUNDWATER MEASUREMENTS

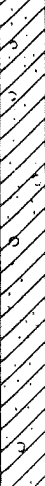
DEPTH AT COMPL. --- FT. CAVE-IN DEPTH 41 FT.
 AFTER --- HRS. --- FT. AFTER --- HRS. --- FT.
 AFTER --- HRS. --- FT. AFTER --- HRS. --- FT.

DRILLING & SAMPLING NOTES

DATE BEGUN 5-19-86 DATE COMPL. 5-19-86
 CREW Hodgell & Pittner RIG Acker ADII
 METHOD 3 1/2" HSA, ASTM D1452, D1586 & D1587

BORING LOG OF TEST HOLE NO. B8

PROJECT MCCARTY PARK - MIS RELIEF SEWER LOCATION West Allis, Wisconsin
 SURFACE ELEVATION 151.61 JOB NO. 8798 CLIENT MILWAUKEE METROPOLITAN SEWERAGE DISTRICT
 BENCHMARK OR DATUM MMSD Datum COORDINATES: (N) 366615.3373 (E) 2532604.3431

DEPTH	SAMPLE DEPTH RECOVERY	SOIL DESCRIPTION - PRIMARY SOIL, consistency / density, moisture, color, secondary soil types. Remarks.	SYM	UNIFIED CLASSIF.	N	P.P. (TSF)	q _u	LL PL PI	γ _d %	OTHER LAB. TESTS	
30	SS-6 11"	SILTY CLAY - very stiff, grey brown, little to some sand, trace gravel		CL	19	2.2			16.1	Gradatio	
					2.2						
					2.2						
					2.0						
					1.7	20					
					2.7						
35	ST-8 20"					-	3.7				15.0
					3.0						
					3.2						
						23	3.7				19.1
				3.0							
				4.2							
40	ST-10 20"				-	2.2					
						2.2					
						1.2					
		41'									
45		BORING TERMINATED AT 41'									
50		BORING TERMINATED AT 41'									
55		BORING TERMINATED AT 41'									

GROUNDWATER MEASUREMENTS

DEPTH AT COMPL. FT. CAVE-IN DEPTH 41 FT.

AFTER HRS. FT. AFTER HRS. FT.

AFTER HRS. FT. AFTER HRS. FT.

DRILLING & SAMPLING NOTES

DATE BEGUN 5-19-86 DATE COMPL. 5-19-86

CREW Hodgell & Pittner RIG Acker ADII

METHOD 3 1/2" HSA, ASTM D1452, D1586 & D1587



MILWAUKEE TESTING LABORATORY, INC.

2135 SOUTH 116TH STREET
MILWAUKEE, WISCONSIN 53227
TELEPHONE: 321-0100

Log of Boring No. 5

Sheet 1 of 1

Project CONTRACT 242

Reported to: Metropolitan Sewerage Commission, P.O. Box 2079, Milwaukee, Wisconsin

Drive Pipe: O.D. 2 " Wt. 140 # fall 30 " Location: Station 25+10 - Offset 15' S.E.

Sampler Spoon O.D. 2 " Wt. 140 # fall 30 " Existing Surface on Date of Boring or Ground El: 150.2

Ground Water Observations

Date 8/20/70 Time After Boring Depth 5 1/2' below surface Remarks 10' 11' 12' 13' 14' 15' 16' 17' 18' 19' 20' 21' 22' 23' 24' 25' 26' 27' 28' 29' 30'

Party R. St. Denis Date: Start 8/20/70
R. House Finish 8/20/70

Moisture: Dry; D = Damp; M = Moist; W = Wet

Truck No. 2 Rig CYE

Sample No.	Moisture	PL-% LL-%	Blows on Sampler per Foot	CLASSIFICATION AND REMARKS	Recommended Maximum Allowable Bearing Value in Lb. or Sq. Ft.	Depth in Feet	Elevation	Uncorr. Sct. Ton Field Unit	Uncorr. Sct. Lb. per Sq. Ft.	Lab. Sct. Ton per Sq. Ft.	Dr. Pipe Blows
1	M	13	X	Fill - Mixed black and brown fine to coarse SAND - silty, with small gravel, trace of clay and topsoil. (Moist)	3,000	0	145.2				
2	W	13	X	Firm grey fine to medium SAND - silty, trace of small gravel. (Wet)	3,000	10	140.2				
3	W	15	X		3,000	15	135.2				
4	W	12	X		3,000	20	130.2				
5	M	8	X	Stiff grey CLAY - very silty, trace of sand. (Moist)	2,000	25	125.2	1.0			
6	M	9	X		2,000	30	120.2	1.0			
7	M	22	X	Very stiff grey CLAY - silty, trace of sand and small to large gravel. (Moist)	6,000	35	115.2	4.5+			
8	W	17	X	Firm grey fine to coarse SAND - silty with small to large gravel. (Wet)	6,000	40	110.2				
END OF BORING: 39'						40	110.2				



MILWAUKEE TESTING LABORATORY, INC.

2135 SOUTH 116TH STREET
MILWAUKEE, WISCONSIN 53227

TELEPHONE: 321-0100

Log of Boring No. 6

Sheet 1 of 1

Project CONTRACT 242

Reported to: Metropolitan Sewerage Commission, P.O. Box 2079, Milwaukee, Wisconsin

Drive Pipe Split O.D. " Wt. # fall " Location: Station 30+55 - Offset 10' E.

Sampler Spoon O.D. 2 " Wt. 140 # fall 30 " Existing Surface on Date of Boring or Ground El: 154.4

Ground Water Observations
Date 8/20/70 Time After Boring 10' below surface

Party
R. St. Denis
R. Rouse

Date: Start 8/20/70
Finish 8/20/70

Moisture: Dry; D = Damp; M = Moist; W = Wet

Truck No. 2 Rig CME

Sample No.	Moisture	PL-% LL-%	Blows on Sampler per Foot	CLASSIFICATION AND REMARKS	Recommended Maximum Allowable Bearing Value in Lb. or Sq. Ft.	Depth in Feet	Elevation	Unconf. Str. Test Field Test	Unconf. Str. Test Lab. Test	Dr. Pipe Blows
1	M		7	Fill - Loose black and brown fine to coarse Sand - scattered foundry sand, cinders and clay. (Moist to Wet)	2,000	0	149.4			
2	W		9		2,000	5	144.4			
3	W		6	Firm grey fine to medium SAND - silty. (Wet) Loose grey Silt - trace of clay and fine sand. (Wet)	2,000 1,000	10 15	139.4			
4	W		11	Firm grey fine to medium SAND - silty. (Wet)	2,500	20	134.4			
5	M		9	Stiff grey CLAY - very silty, trace of sand and gravel. (Moist)	2,500	25	129.4	1.75		
6	W		26	Firm brown grey fine to coarse SAND-silty, with small to medium gravel, many large seams of silty clay. (Wet) Running	6,000	30	124.4			
7	W		20		6,000	35	119.4			
8	W		17		6,000	40	114.4			
9	W		23		6,000	45	109.4			
END OF BORING: 42'										



MILWAUKEE TESTING LABORATORY, INC.

2135 SOUTH 116TH STREET
MILWAUKEE, WISCONSIN 53227
TELEPHONE: 321-0100

Log of Boring No. 7

Sheet 1 of 1

Project CONTRACT 242

Reported to: Metropolitan Sewerage Commission, P.O. Box 2079, Milwaukee, Wisconsin

Drive Pipe: O.D. 2" Wt. 140 # fall 30" Location: Station 35+00—offset 25' East

Sampler: Split O.D. 2" Wt. 140 # fall 30" Existing Surface on Date of Boring or Ground El.: 151.2

Ground Water Observations

Date 8/17/70 Time After Boring Depth 5 1/2' Remarks 3. St Denis Party X. Rouse Date: Start 8/17/70 Finish 8/17/70

Moisture: Dry; D = Damp; M = Moist; W = Wet

Time No. 2 Rig CME

Sample No.	Moisture	PL-% LL-%	Blows on Sampler per Foot	CLASSIFICATION AND REMARKS	Recommended Maximum Allowable Bearing Value in Lb. or Sq. Ft.	Depth in Feet	Elevation	Unconf. Sur. Test Field Test	Unconf. Sur. Test Lab. Test	Dr. Pipe Blows
1	M		4	Fill - Loose brown and gray fine to medium SAND - silty, trace of clay.	500	0	146.2	0.5		
2	W		6	Loose gray fine to medium SAND - silty and clayey.	1,000	10	141.2			
3	W		9	Loose gray fine to medium SAND - silty, scattered thin seams of silt and silty clay.	2,000	20	131.2			
4	W		7	Loose gray fine to medium SAND - silty, scattered thin seams of silt and silty clay.	2,000	30	126.2			
5	W		10	Loose gray fine to medium SAND - silty, scattered thin seams of silt and silty clay.	2,000	40	121.2			
6	W		13	Loose gray fine to medium SAND - silty, scattered thin seams of silt and silty clay.	2,000	50	116.2			
7	W		9	Stiff gray CLAY - silty.	2,500	60	111.2			
8	M		12	Stiff gray CLAY - silty.	4,000	70	106.2			
				END OF BORING: 39'		80	111.2			



MILWAUKEE TESTING LABORATORY, INC.

2135 SOUTH 116TH STREET
MILWAUKEE, WISCONSIN 53227
TELEPHONE: 321-0100

Metropolitan Sewerage Commission
of the County of Milwaukee

Log of Boring No. B-5ASheet 5 of 9Project CONTRACT # 242, 116th ST., NORTH OF WEST MORGAN AVE., MILWAUKEE, WIS.Reported to: Sewage Commission of the City of Milwaukee, P.O. Box 2079, Milwaukee, Wis.

Drive Pipe: O.D. 2" Wt. 140 # fall 30" Location: As Staked
Sampler O.D. 2" Wt. 140 # fall 30" ~~Extending to 43.0' below surface~~ Ground El: 154.7'

Ground Water Observations

Date Aug. 15, 1972 Time After boring-4.0' below surface
Moisture: Dry; D = Damp; M = Moist; W = Wet

Party

Date: Start 8-15-72Finish 8-15-72Carl KuehneMike LamonteTrack No. 3 Rig Panndrill

Sample No.	Moisture	PL-% LL-%	Blows on Sampler per Foot		Sample	CLASSIFICATION AND REMARKS	Recommended Maximum Allowable Bearing Value in Lb. pr. Sq. Ft.	Depth in Feet	Elevation	Unconf. Str. Test Field Spec.	Unconf. Str. Test Laboratory Test	Dr. Pipe Blows
			12/18	12/6								
						Fill-Brown CLAY-sandy, with some Topsoil.						
						Brown CLAY-very sandy.						
1	M		7		X	Loose brown SAND-silty. Trace of Clay.		149.7				
						MOIST						
2	W		21		X	Firm brown & grey fine to coarse SAND with some small silty gravel. Trace of clay.		144.7				
						WET						
3	D		13		X	Stiff grey CLAY-silty, with very fine grey sand seams.		139.7	2.5			
						DAMP						
						Very stiff grey CLAY-silty. Some very fine seams of grey sand.						
4	D		16		X			134.7	2.5			
5	D		29		X			129.7	4.5			
						DAMP						
						Firm grey fine to medium SAND.						
6	W		14		X			124.7				
7	W		17		X			119.7				
								114.7				
8	W		12		X			111.7				
						WET						
						END OF BORING-43.0'						
						NOTE: Boring advanced with 4 1/2" O.D. flight augers. No casing or mud used to keep bore hole open.						



MILWAUKEE TESTING LABORATORY, INC.

2135 SOUTH 116TH STREET
MILWAUKEE, WISCONSIN 53227
TELEPHONE: 321-0100Metropolitan Sewerage Commission of
the County of MilwaukeeLog of Boring No. B-6ASheet 6 of 9Project CONTRACT # 242, 116th ST., NORTH OF WEST MORGAN AVE., MILWAUKEE, WIS.Reported to: Sewage Commission of the City of Milwaukee, P.O. Box 2079, Milwaukee, Wis.Drive Pipe: O.D. 2 " Wt. 140 # fall 30 " Location: As Staked
Sampler O.D. 2 " Wt. 140 # fall 30 " ~~Extending surface to 20.0' below ground~~ Ground El: 157.9'

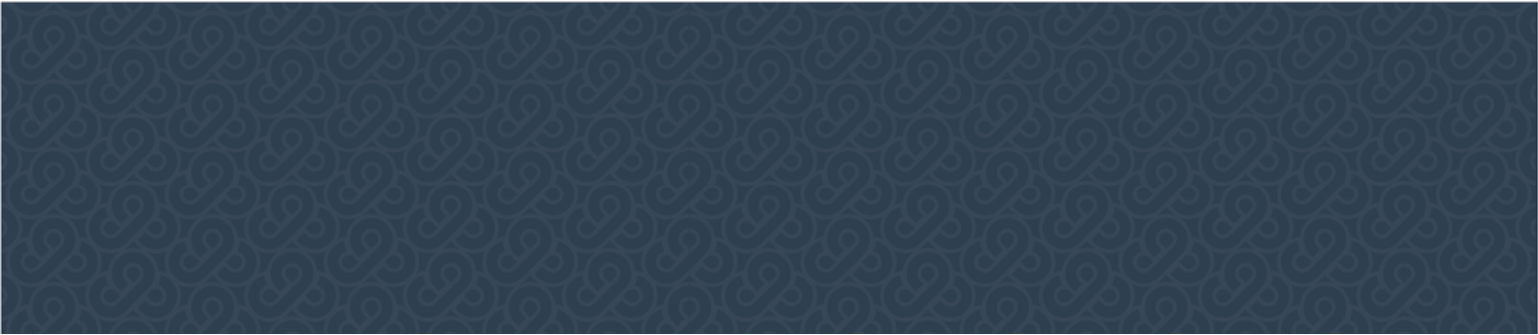
Ground Water Observations

Date Aug. 16, 1972 Time After boring-20.0' below surfaceParty Carl Kuehne Date: Start 8-16-72Mike Lamonte Finish 8-16-72

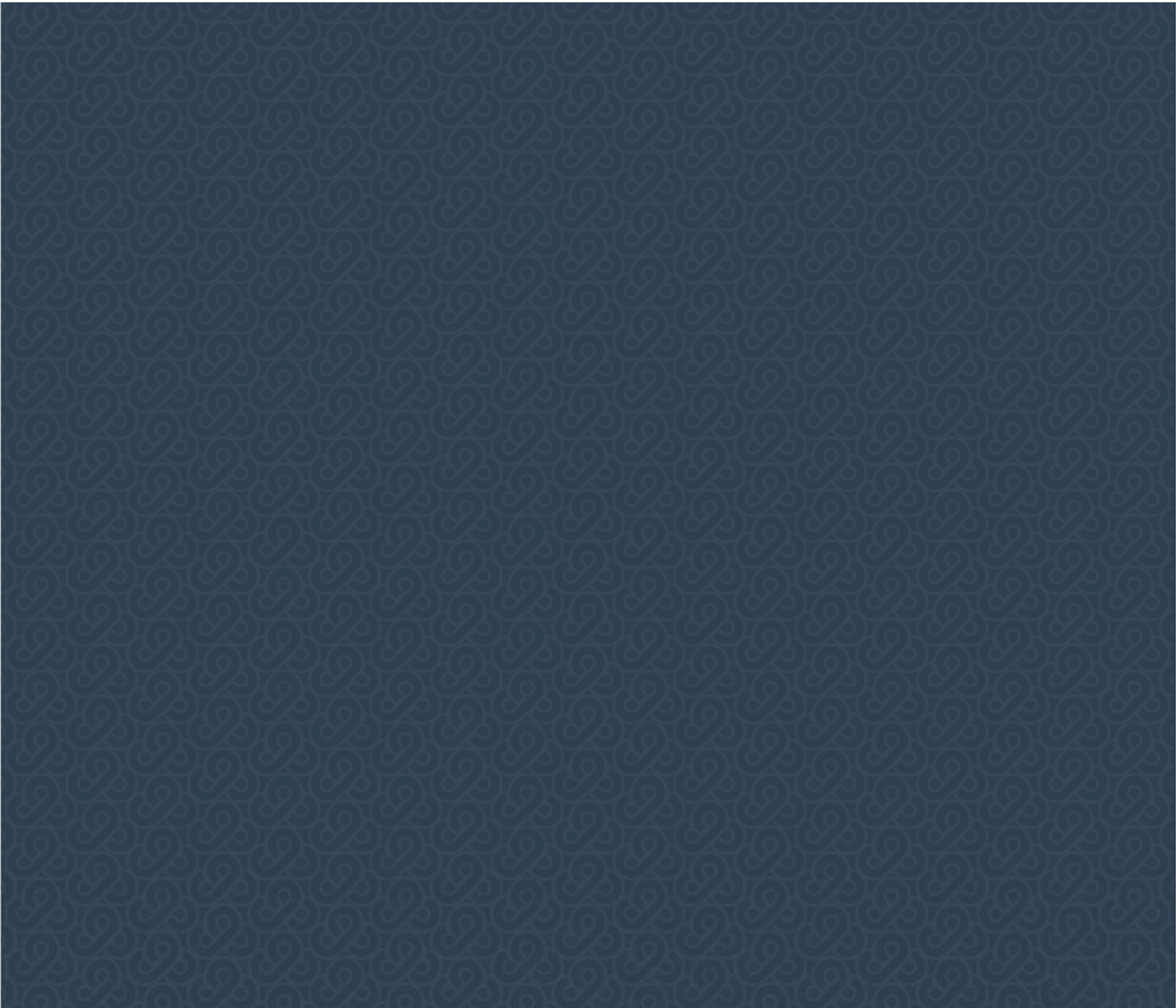
Moisture: Dry; D = Damp; M = Moist; W = Wet

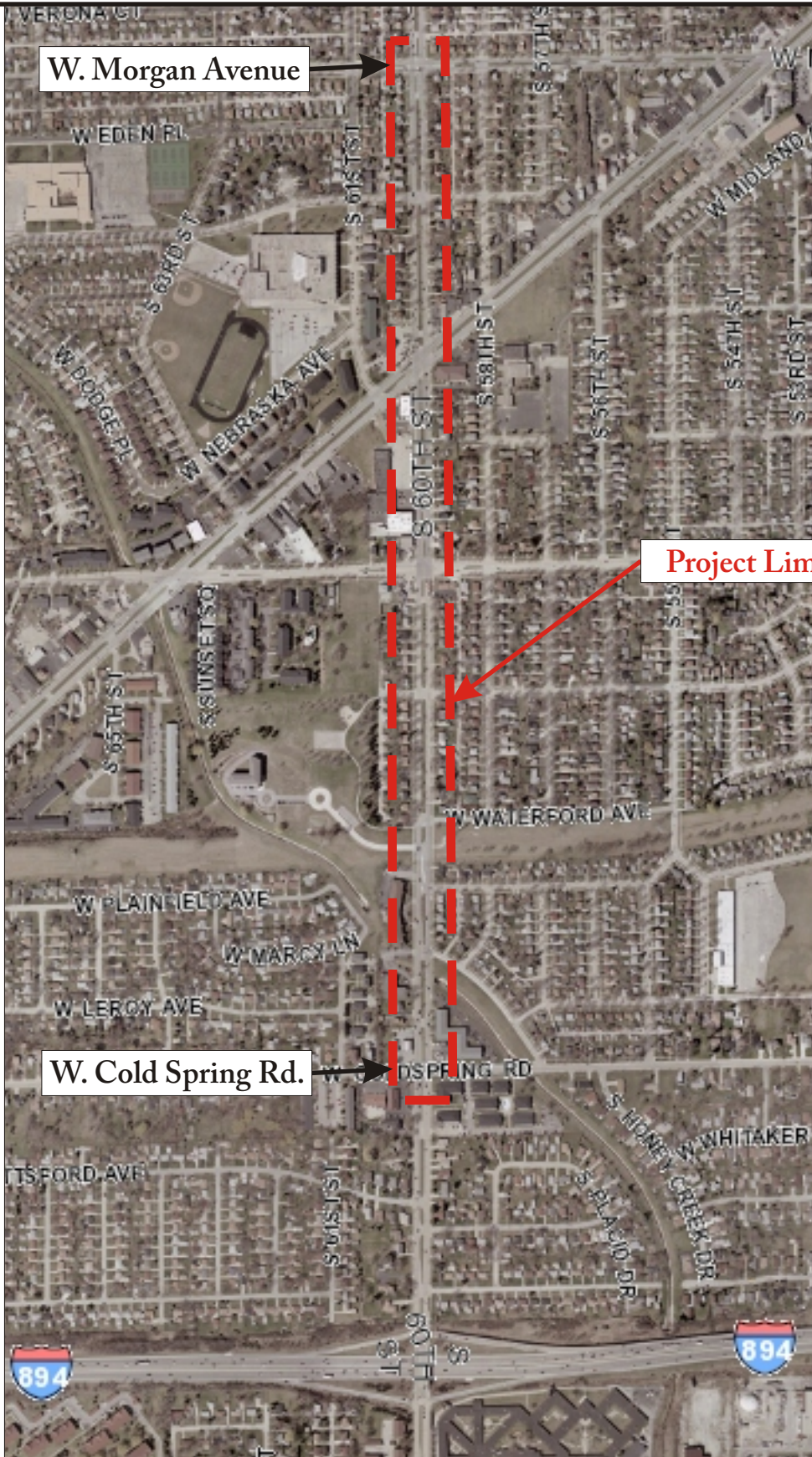
Truck No. 3 Rig Panndrill

Sample No.	Moisture	PL-% LL-%	Blows on Sampler per Foot	12/18 12/6	CLASSIFICATION AND REMARKS	Recommended Maximum Allowable Bearing Value in Lb. pr. Sq. Ft.	Depth in Feet	Elevation	Uncorr. Sur. To Field Penet.	Uncorr. Sur. to Lab. Penet.	Dr. Pipe Blows
					TOPSOIL		0				
					Very stiff brown CLAY-silty, sandy with seams of fine brown Sand.						
1	DRY		21	X			5	152.9	4.5		
2	D		18	X			10	147.9	4.5		
					DAMP						
					Firm grey SILT-sandy. Trace of Clay after 15.0'.						
3	W		29	X			15	142.9			
4	W		21	X			20	137.9			
					WET						
5	W		43	X	Dense grey fine to medium SAND-with small to large gravel.		25	132.9			
					WET						
					Hard grey CLAY-silty, sandy with wet layers of fine to medium grey sand.						
6	D		39	X			30	127.9	4.5+		
7	M		32	X			35	122.9	4.5		
8	M		33	X			40	117.9	4.0		
9	M		41	X			45	112.9	4.5+		
					MOIST						
					END OF BORING-45.0'						
					Remark: Boring moved 7.0' due east of staked location due to dis- covery of utilities.						
					NOTE: Boring advanced with 4 1/2" O.D. flight augers. No casing or mud used to keep bore hole open.						
							50				
							55				



Appendix B-15 – 60th Street Soil Borings Near Route Alternatives





W. Morgan Avenue

Project Limits

W. Cold Spring Rd.



GESTRA Engineering, Inc.
191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: (414) 933-7444
Fax: (414) 933-7844

Project Name & Location:

S. 60th Street
(W. Morgan Ave to W. Cold Spring Rd.)
Milwaukee, WI

Drawing Title:
Site Map

Project No.: 15133-10

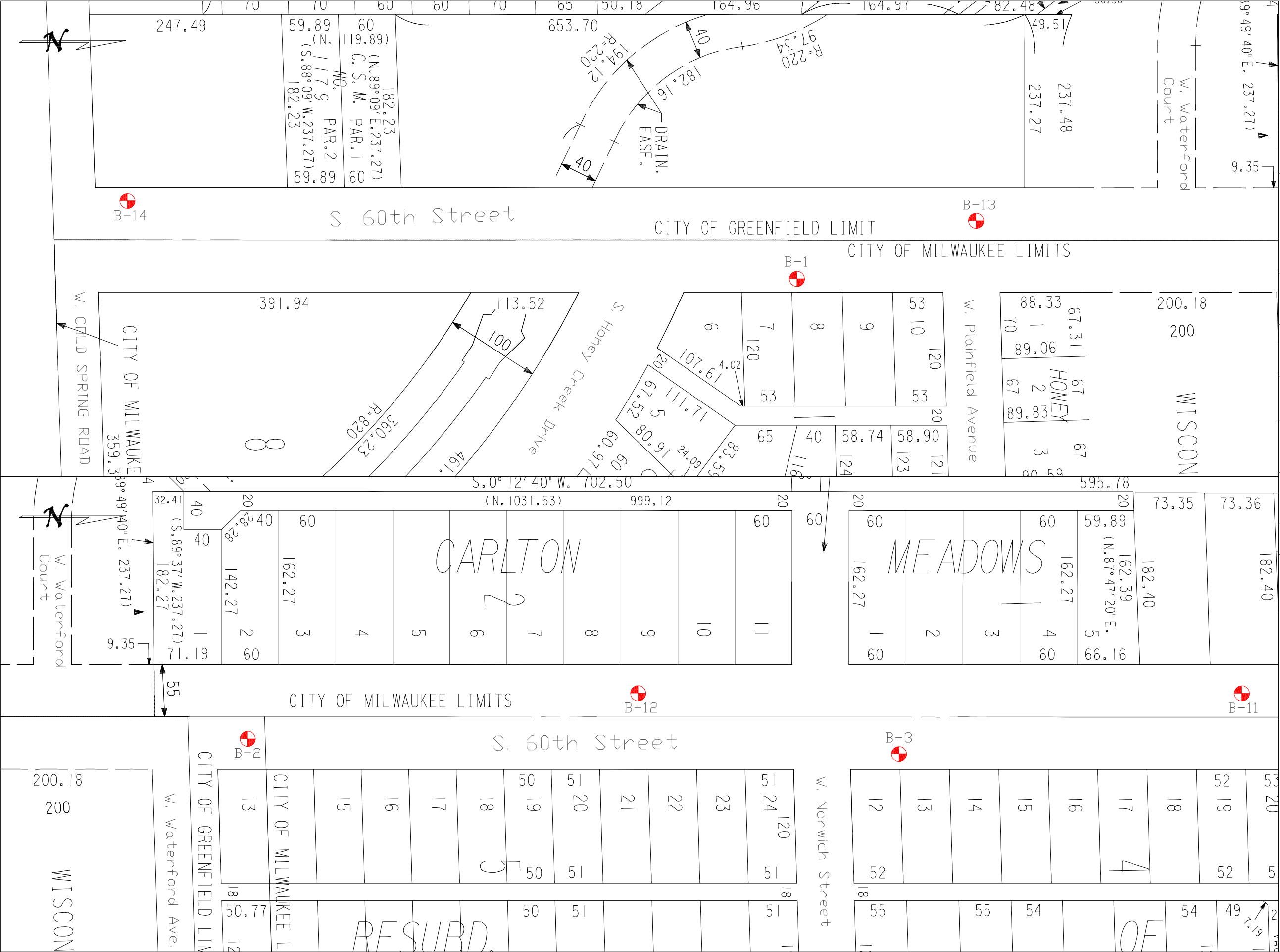
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Drawing No.: 1 of 1

Checked by: ESJ

Checked by: DB

Date: August 25, 2015





GESTRA Engineering, Inc.
191 W. Edgerton Avenue
Milwaukee, WI-53207
Phone: 414-933-7444 Fax: 414-933-7844
www.gestrainc.com

Project Name & Location:
S. 60th Street
(W. Cold Spring Rd to W. Morgan Ave.)
Milwaukee, WI

Project No.:
15133-10

Drawing Title:
Borehole Location Map


Drawing No.:
1 of 2

Date:
8/25/2015

Scale:
1:100

Drawn by:
ESJ

Checked by:
DB

 = BOREHOLE LOCATION



GESTRA Engineering, Inc.

191 W. Edgerton Avenue
Milwaukee, WI-53207
Phone: 414-933-7444 Fax: 414-933-7844
www.gestrainc.com

Project Name & Location:

S. 60th Street
(W. Cold Spring Rd to W. Morgan Ave.)
Milwaukee, WI

Project No.:

15133-10

Drawing Title:

Borehole Location Map

Drawing No.:

2 of 2

Date:

8/25/2015

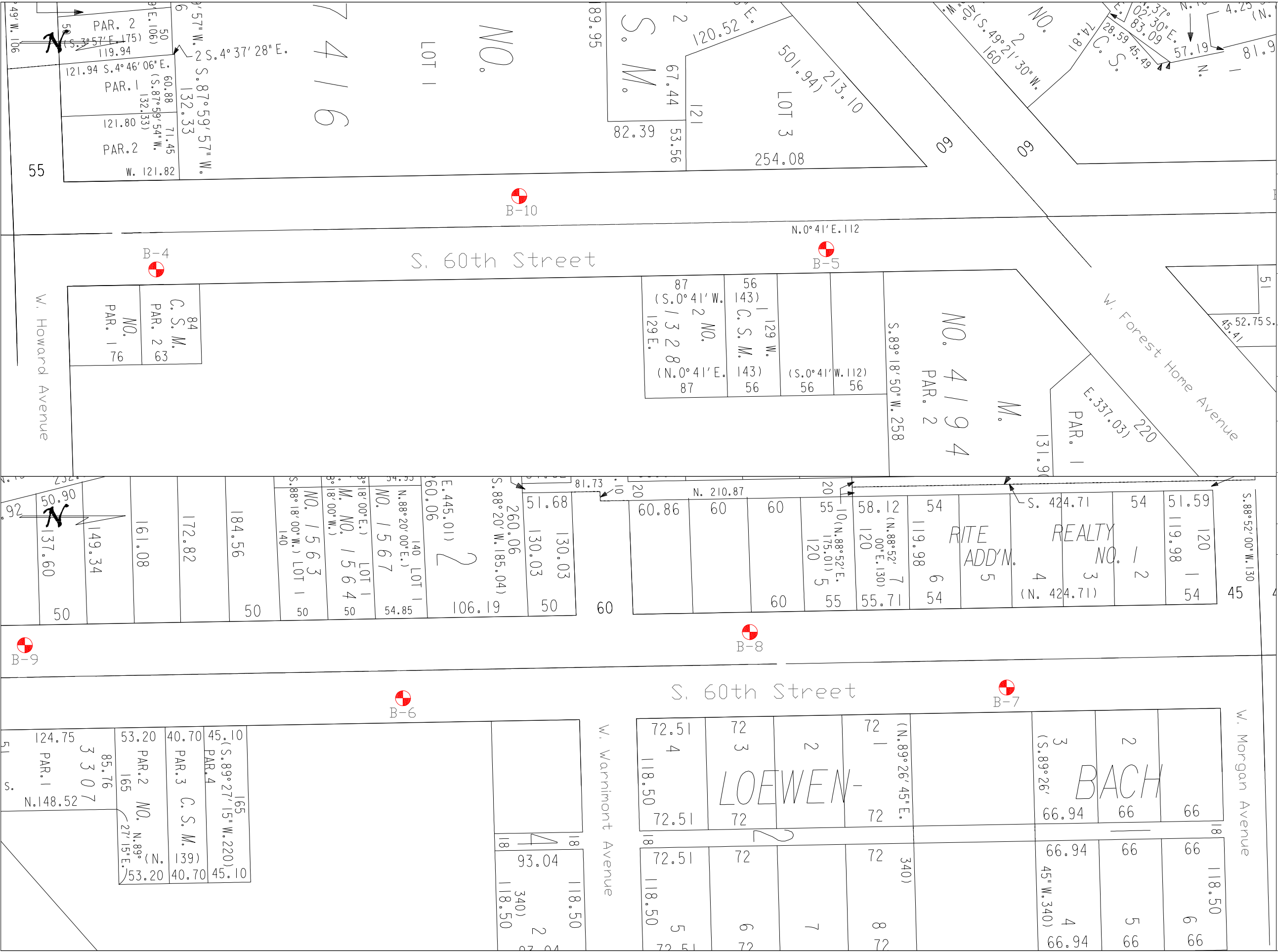
Scale:

1:100

Drawn by:
ESJ

Checked by:
DB

 = BOREHOLE LOCATION





Gestra Engineering Inc.
191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

SOIL BORING LOG

PAGE NUMBER

1 of 1

PROJECT NAME

S. 60th Street

DATE DRILLING STARTED

8/17/2015

BORING NUMBER

B-3

PROJECT LOCATION

Milwaukee, WI and Greenfield, WI

DATE DRILLING ENDED

8/17/2015

PROJECT NUMBER

15133-10

DRILLING RIG

CME 75 (International)

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: B. Sargent

FIELD LOG

D. Harris

NORTHING

LAB LOG / QC

E. Jeske

EASTING

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	10	2 2 4	6		CONCRETE (7")								
					BASE COURSE (6")								
					SANDY LEAN CLAY, dark gray with brown, moist, (FILL)	A-6						17	
SS - 2	12	2 3 8	11		LEAN CLAY, brown, moist, (FILL)	A-6						15	
					LEAN CLAY, brown, moist, hard	A-6						14	
SS - 3	18	3 7 10	17		End of Boring at 7.5 ft.				4.0-4.5+				
				10									
				15									
				20									

WATER & CAVE-IN OBSERVATION DATA

<input type="checkbox"/>	WATER ENCOUNTERED DURING DRILLING (ft): NE	<input type="checkbox"/>	CAVE DEPTH AT COMPLETION (ft): NMR	WET <input type="checkbox"/>
<input type="checkbox"/>	WATER LEVEL AT COMPLETION (ft): NE	<input type="checkbox"/>	CAVE DEPTH AFTER 0 HOURS (ft): NMR	DRY <input type="checkbox"/>
<input type="checkbox"/>	WATER LEVEL AFTER 0 HOURS (ft): NMR		NE = Not Encountered; NMR = No Measurement Recorded	DRY <input type="checkbox"/>

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



Gestra Engineering Inc.
191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

SOIL BORING LOG

PAGE NUMBER

1 of 1

PROJECT NAME

S. 60th Street

DATE DRILLING STARTED

8/17/2015

BORING NUMBER

B-4

PROJECT LOCATION

Milwaukee, WI and Greenfield, WI

DATE DRILLING ENDED

8/17/2015

PROJECT NUMBER

15133-10

DRILLING RIG

CME 75 (International)

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: B. Sargent

FIELD LOG

D. Harris

NORTHING

LAB LOG / QC

E. Jeske






EASTING

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	6	2 3 6	9		CONCRETE (5")	0.4			4.5+			23	
					BASE COURSE (5")	0.8							
					LEAN CLAY, dark gray to gray, moist, hard	A-6							
SS - 2	15	5 8 12	20	5	LEAN CLAY, brown mottled gray, moist, hard	2.5		A-6	4.5+	31	16	15	
SS - 3	16	7 9 13	22						4.5+			18	
					End of Boring at 7.5 ft.	7.5							
				10									
				15									
				20									

WATER & CAVE-IN OBSERVATION DATA

	WATER ENCOUNTERED DURING DRILLING (ft): NE		CAVE DEPTH AT COMPLETION (ft): NMR	WET <input type="checkbox"/>
	WATER LEVEL AT COMPLETION (ft): NE		CAVE DEPTH AFTER 0 HOURS (ft): NMR	DRY <input type="checkbox"/>
	WATER LEVEL AFTER 0 HOURS (ft): NMR		NE = Not Encountered; NMR = No Measurement Recorded	WET <input type="checkbox"/>
				DRY <input type="checkbox"/>

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



Gestra Engineering Inc.
191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

SOIL BORING LOG

PAGE NUMBER

1 of 1

PROJECT NAME

S. 60th Street

DATE DRILLING STARTED

8/18/2015

BORING NUMBER

B-10

PROJECT LOCATION

Milwaukee, WI and Greenfield, WI

DATE DRILLING ENDED

8/18/2015

PROJECT NUMBER

15133-10

DRILLING RIG

CME 75 (International)

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: B. Sargent

FIELD LOG

E. Jeske

NORTHING

LAB LOG / QC

E. Jeske

EASTING

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	5	3 3 6	9		ASPHALT (2") CONCRETE (5") BASE COURSE (4 1/2") LEAN CLAY WITH SAND, brown mottled gray, moist, hard								Sample disted unable to obtain Q_p Gravel = 1.4% Sand = 22.5% P200 = 76.1%
SS - 2	13	4 9 13	22	5		A-6		4.25-4.5+				16	
SS - 3	13	5 11 16	27					4.5+				18	
				10	End of Boring at 7.5 ft.								
				15									
				20									

WATER & CAVE-IN OBSERVATION DATA

	WATER ENCOUNTERED DURING DRILLING (ft): NE		CAVE DEPTH AT COMPLETION (ft): NMR	WET <input type="checkbox"/> DRY <input type="checkbox"/>
	WATER LEVEL AT COMPLETION (ft): NE		CAVE DEPTH AFTER 0 HOURS (ft): NMR	WET <input type="checkbox"/> DRY <input type="checkbox"/>
	WATER LEVEL AFTER 0 HOURS (ft): NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



Gestra Engineering Inc.
191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

SOIL BORING LOG

PAGE NUMBER

1 of 1

PROJECT NAME

S. 60th Street

DATE DRILLING STARTED

8/18/2015

BORING NUMBER

B-11

PROJECT LOCATION

Milwaukee, WI and Greenfield, WI

DATE DRILLING ENDED

8/18/2015

PROJECT NUMBER

15133-10

DRILLING RIG

CME 75 (International)

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: B. Sargent

FIELD LOG

E. Jeske

NORTHING

LAB LOG / QC

E. Jeske

EASTING

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

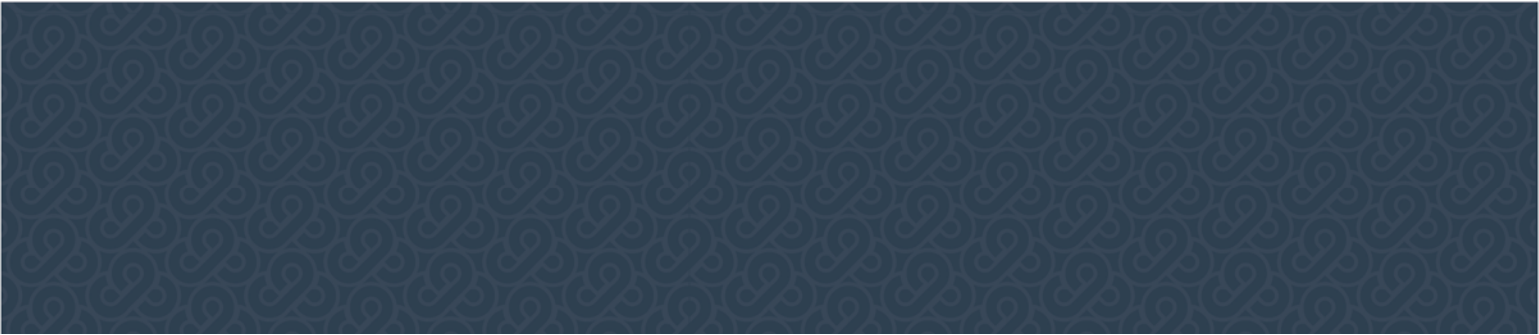
ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	6	2 2 3	5		ASPHALT (2")								
					CONCRETE (5")								
					BASE COURSE (4 1/2"-5")								
SS - 2	10	3 6 10	16		LEAN CLAY, dark gray, moist, medium stiff to stiff	A-6			0.5-1.75	32	16	19	
					LEAN CLAY, brown mottled gray, moist, very stiff to hard								
				5		A-6			3.0-3.25			19	
SS - 3	17	5 10 14	24		No mottling below 6'				4.5+			14	
				7.5	End of Boring at 7.5 ft.								
				10									
				15									
				20									

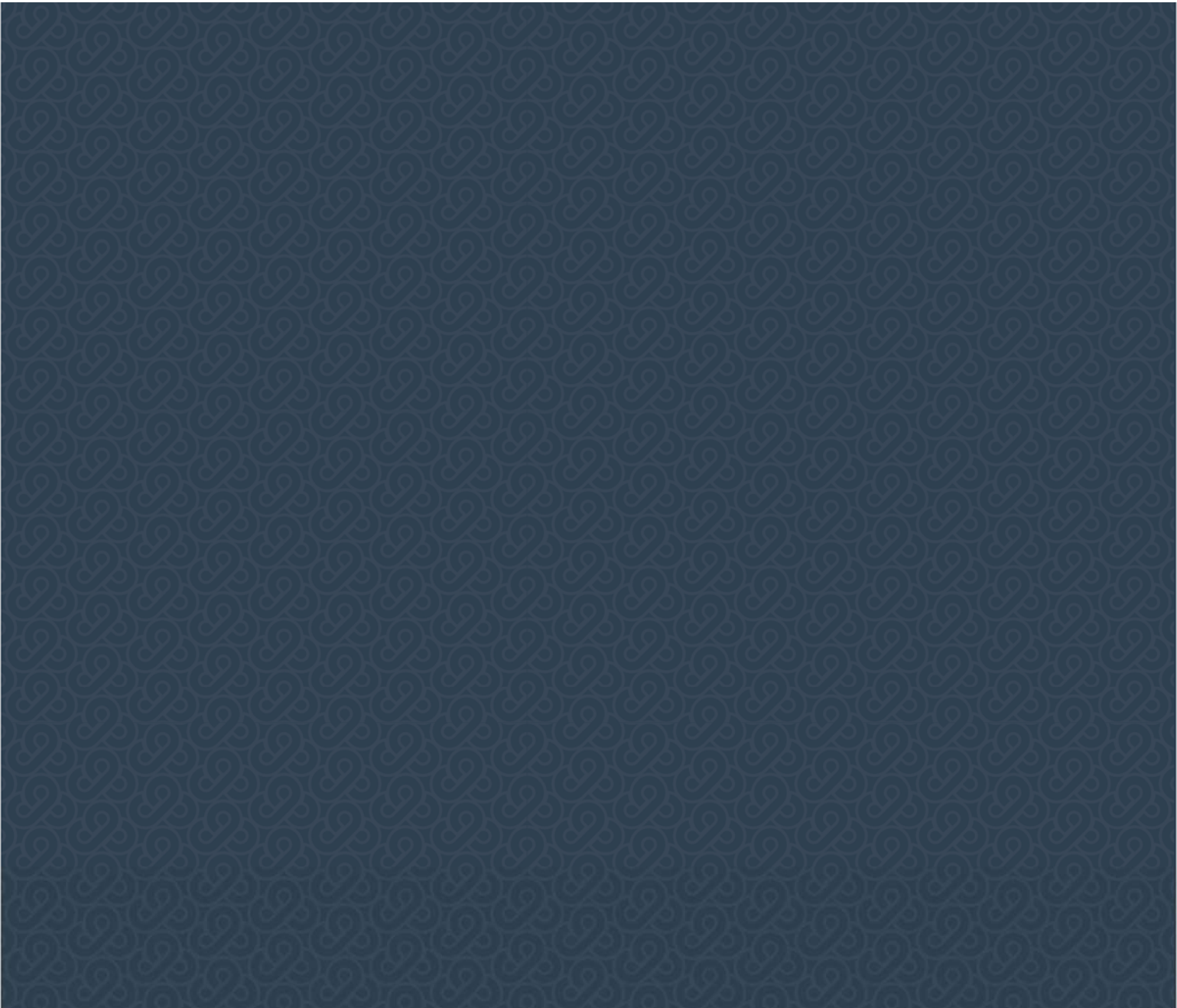
WATER & CAVE-IN OBSERVATION DATA

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	WATER LEVEL AT COMPLETION (ft): NE		CAVE DEPTH AFTER 0 HOURS (ft): NMR	WET <input type="checkbox"/> DRY <input type="checkbox"/>
	WATER LEVEL AFTER 0 HOURS (ft): NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.






Appendix B-16 – PSI Soil Borings Near Racine Avenue












Legend

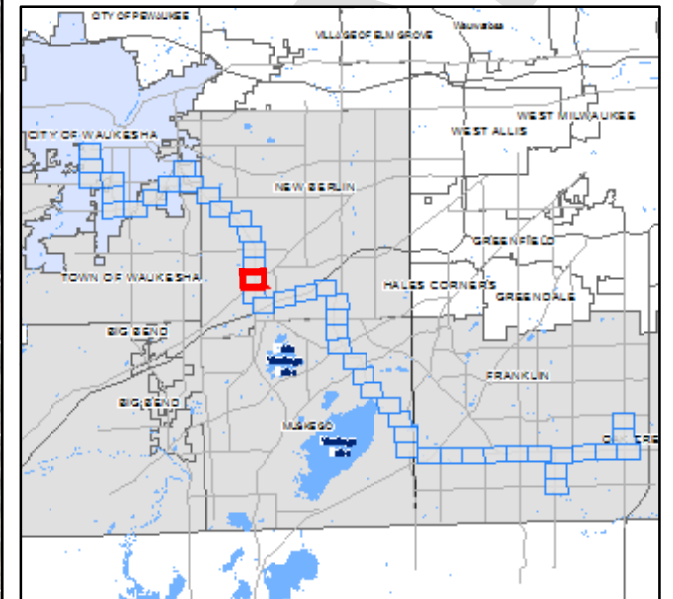
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-  FEMA Flood Zone AE
-  NWI Wetland

Tax Parcel

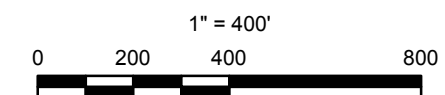
-  Casing
-  HDD
-  Route Alignment

Type

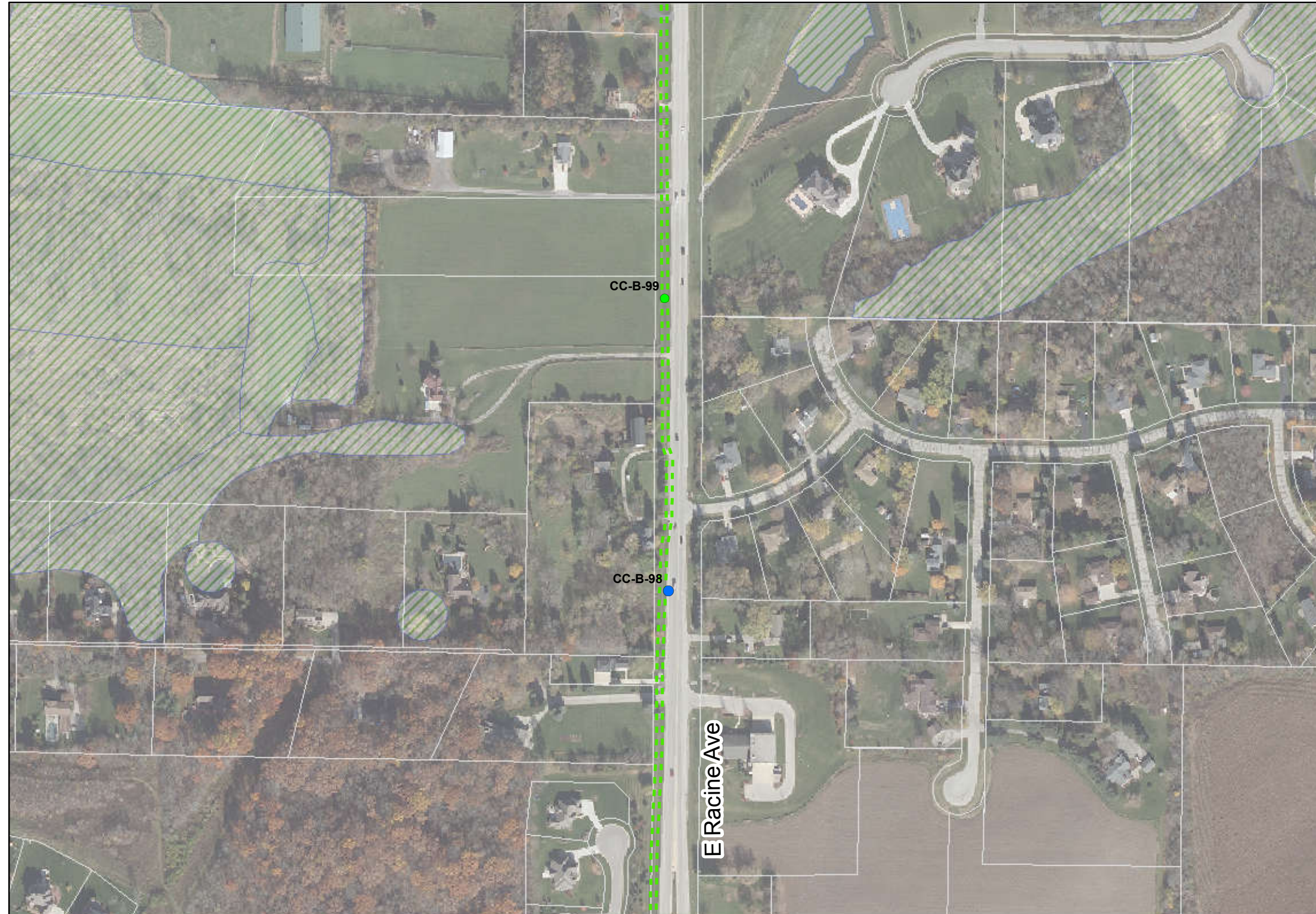
-  1000 ft Borings
-  Pavement Borings
-  Casing Borings
-  HDD Borings






Key Map






Plotted: 8/9/2017
Document Path: G:\15310-Waukesha Great Lakes Water Supply PM-CM24 GIS\24.01_Exhibits\Phase_2\Subconsultant Figures\YK\Geotech_Sub_Borings.mxd







Legend

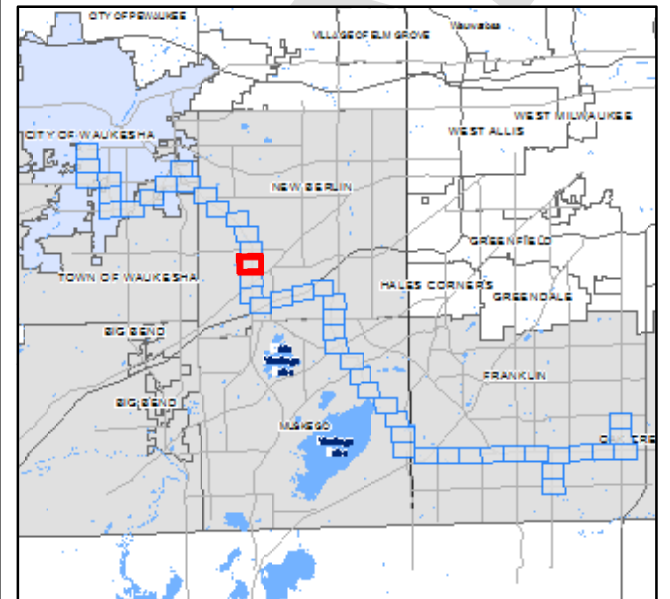
-  FEMA Flood Zone A, (Unstudied)
-  FEMA Flood Zone AE
-  NWI Wetland

Tax Parcel

-  Casing
-  HDD
-  Route Alignment

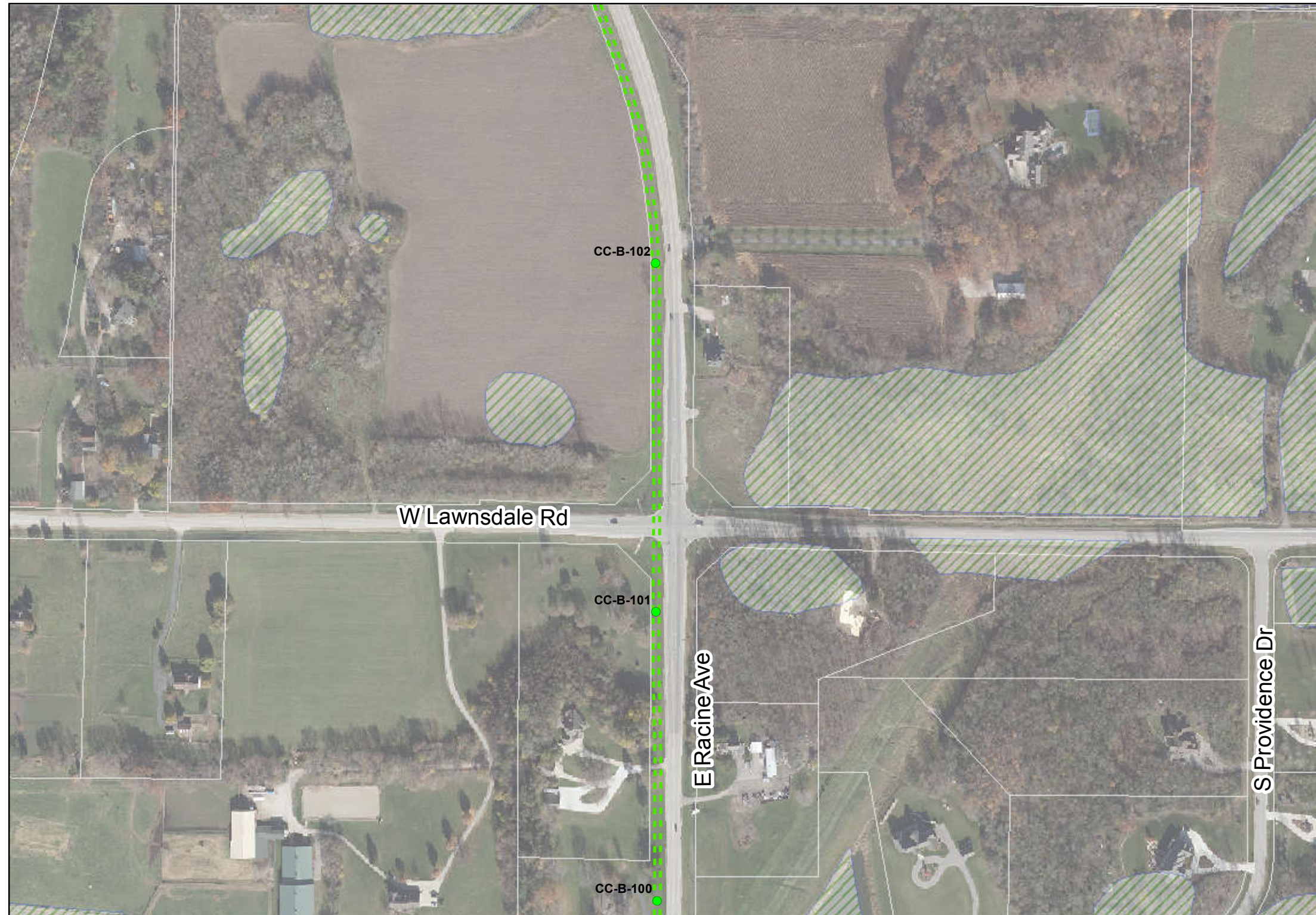
Type

-  1000 ft Borings
-  Pavement Borings
-  Casing Borings
-  HDD Borings



Key Map

Plotted: 8/9/2017
Document Path: G:\15310-Waukesha Great Lakes Water Supply PM-CM24 GIS\24.01_ Exhibits\Phase_2\Subconsultant Figures\YK\Geotech_Sub_Borings.mxd



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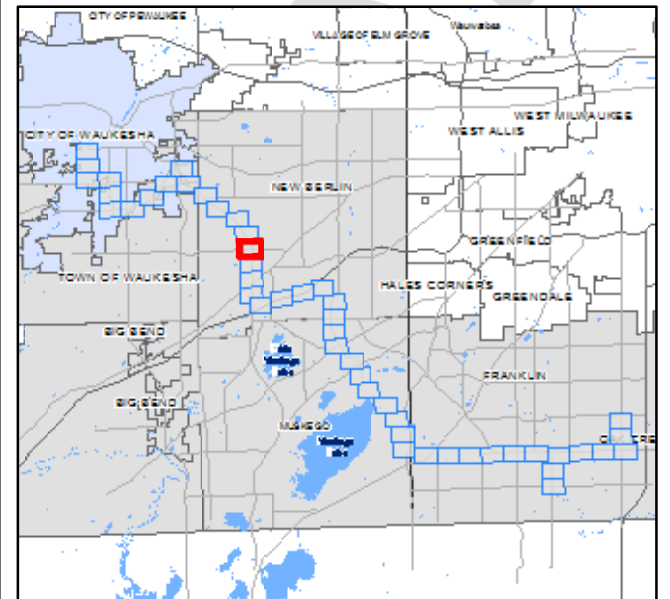
- FEMA Flood Zone A, (Unstudied)
- FEMA Flood Zone AE
- NWI Wetland

Tax Parcel

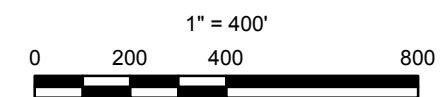
- Casing
- HDD
- Route Alignment

Type

- 1000 ft Borings
- Pavement Borings
- Casing Borings
- HDD Borings



Key Map



Plotted: 8/9/2017
Document Path: G:\15310-Waukesha Great Lakes Water Supply PM-CM24 GIS\24.01_Exhibits\Phase_2\Subconsultant Figures\YK\Geotech_Sub_Borings.mxd



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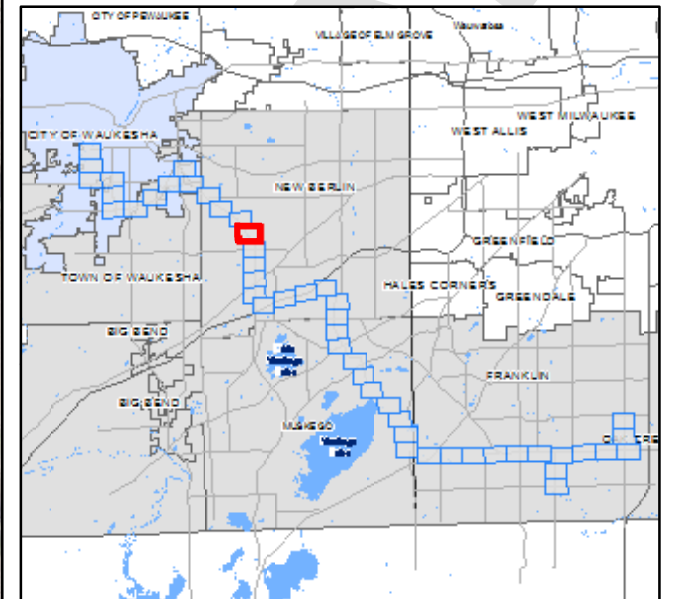
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- FEMA Flood Zone AE
- NWI Wetland

Tax Parcel

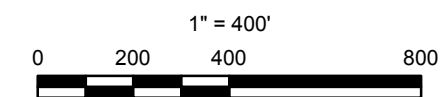
- Casing
- HDD
- Route Alignment

Type

- 1000 ft Borings
- Pavement Borings
- Casing Borings
- HDD Borings






Key Map




Plotted: 8/9/2017
Document Path: G:\15310-Waukesha Great Lakes Water Supply PM-CM24 GIS\24.01_ Exhibits\Phase_2\Subconsultant Figures\YK\Geotech_Sub_Borings.mxd







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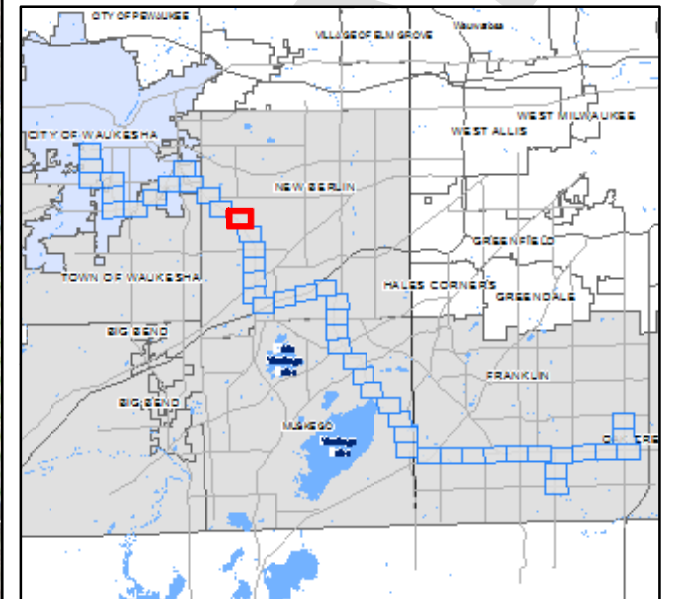
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-  FEMA Flood Zone AE
-  NWI Wetland

Tax Parcel

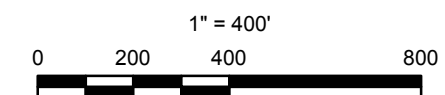
-  Casing
-  HDD
-  Route Alignment

Type

-  1000 ft Borings
-  Pavement Borings
-  Casing Borings
-  HDD Borings



Key Map



Plotted: 8/9/2017
Document Path: G:\15310-Waukesha Great Lakes Water Supply PM-CM24 GIS\24.01_ Exhibits\Phase_2\Subconsultant Figures\YK\Geotech_Sub_Borings.mxd



Legend

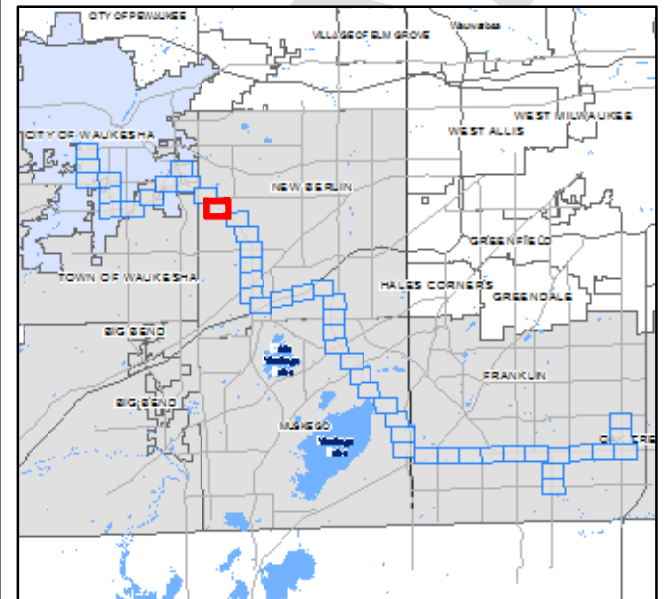
- FEMA Flood Zone A, (Unstudied)
- FEMA Flood Zone AE
- NWI Wetland

Tax Parcel

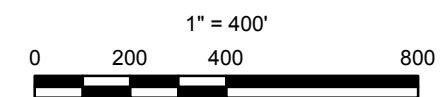
- Casing
- HDD
- Route Alignment

Type

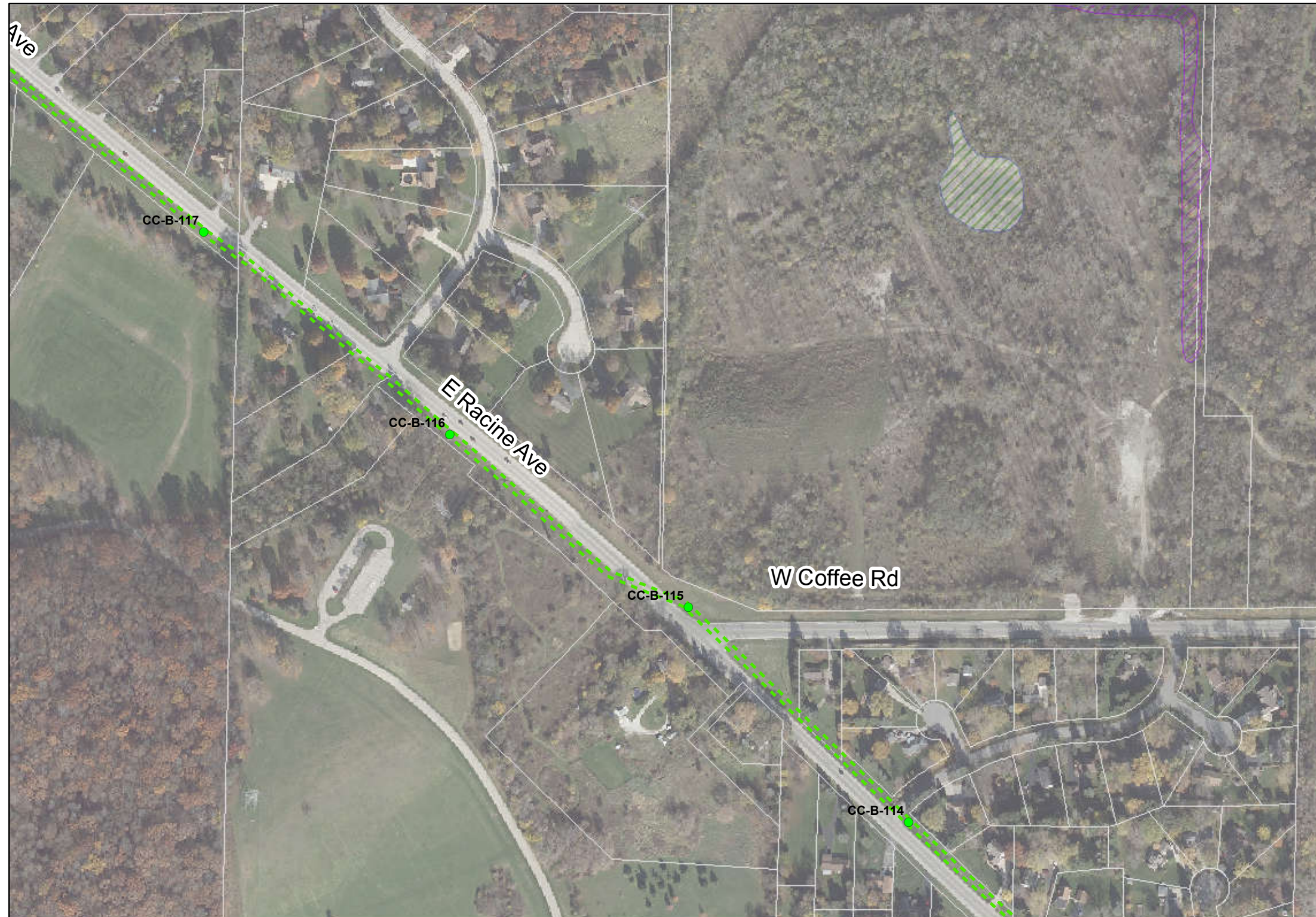
- 1000 ft Borings
- Pavement Borings
- Casing Borings
- HDD Borings



Key Map



Plotted: 8/9/2017
Document Path: G:\15310-Waukesha Great Lakes Water Supply PM-CM24 GIS\24.01_Exhibits\Phase_2\Subconsultant Figures\YK\Geotech_Sub_Borings.mxd



Legend

 FEMA Flood Zone A, (Unstudied)

 FEMA Flood Zone AE

 NWI Wetland





Tax Parcel

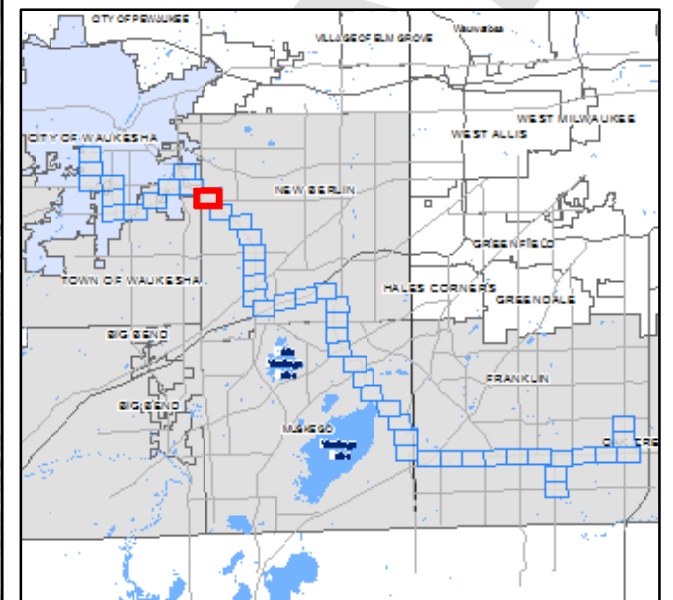
 Casing

 HDD

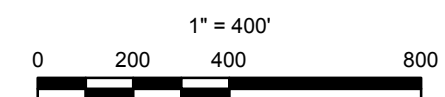
 Route Alignment

Type

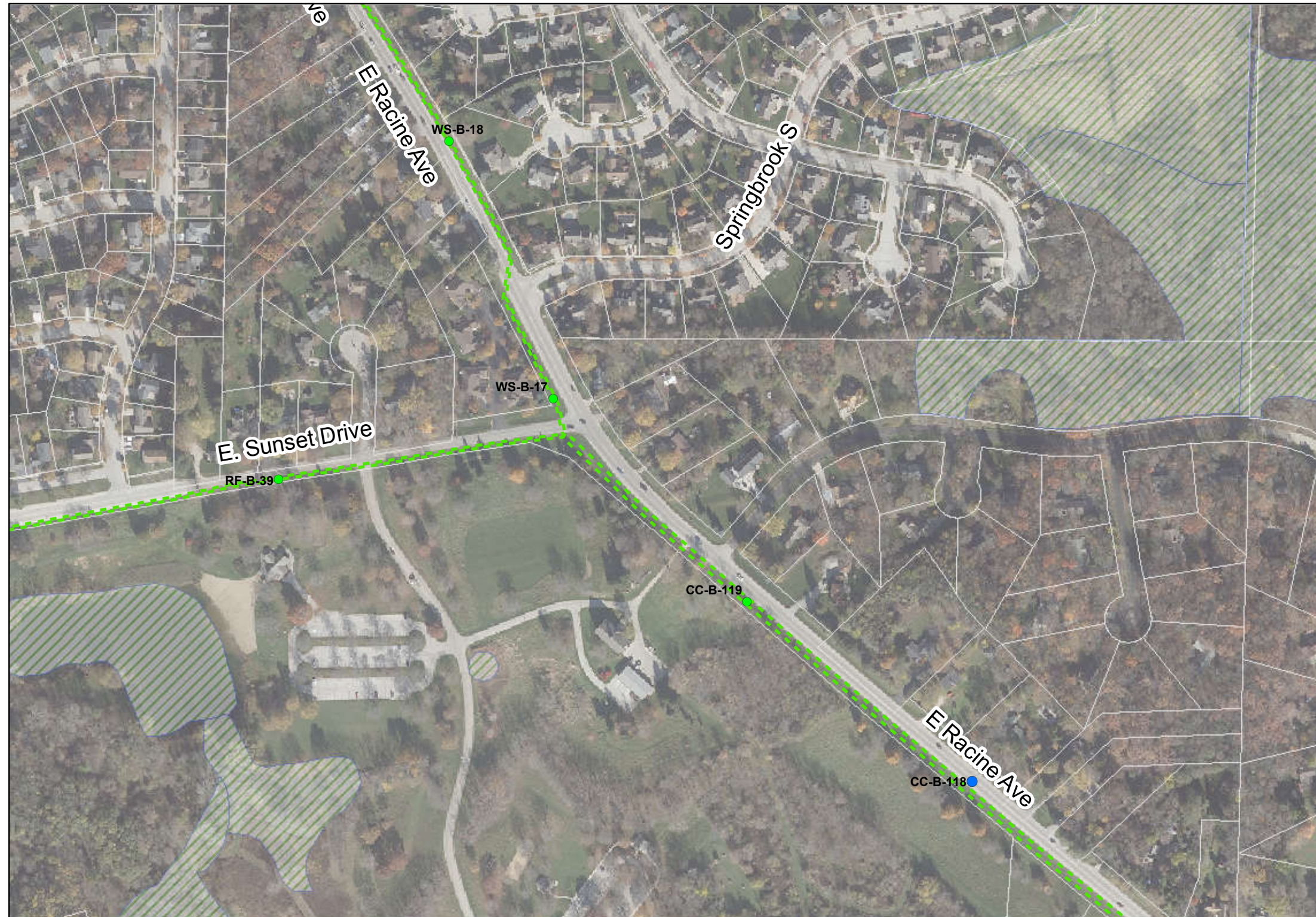
-  1000 ft Borings
-  Pavement Borings
-  Casing Borings
-  HDD Borings






Key Map






Plotted: 8/9/2017
Document Path: G:\15310-Waukesha Great Lakes Water Supply PM-CM24 GIS\24.01_Exhibits\Phase_2\Subconsultant Figures\YK\Geotech_Sub_Borings.mxd







Legend

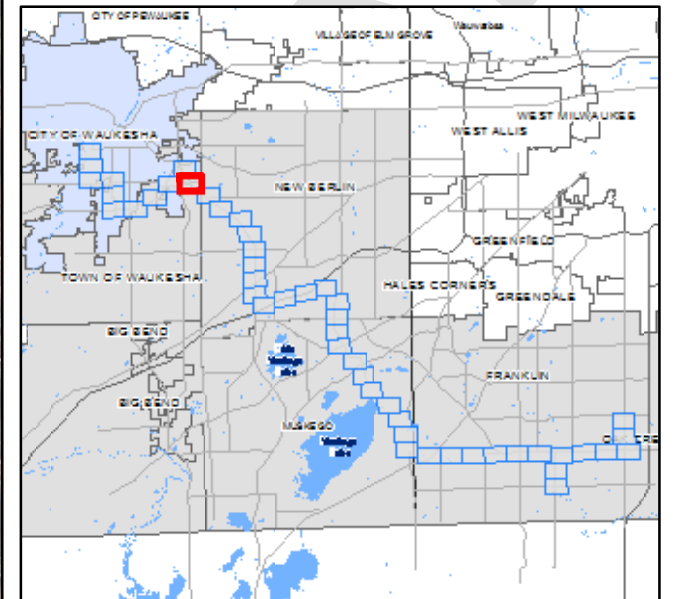
-  FEMA Flood Zone A, (Unstudied)
-  FEMA Flood Zone AE
-  NWI Wetland

Tax Parcel

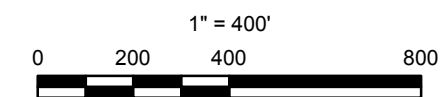
-  Casing
-  HDD
-  Route Alignment




Type

-  1000 ft Borings
-  Pavement Borings
-  Casing Borings
-  HDD Borings



Key Map








PROJECT NAME Great Water Alliance				BORING LOG			 		BORING No		CC-B-105	
PROJECT No 00521741									PAGE No		1 of 1	
CONSULTANT Greeley-Hansen		CONSULTANT PROJECT No			DATE STARTED 9/22/17			HORIZONTAL DATUM NAVD 29		VERTICAL DATUM NAD 27		
DRILLING CONTRACTOR PSI		DRILLING CONTRACTOR PROJECT No			DATE COMPLETED 9/22/17			LATITUDE				
CREW CHIEF S. Briscoe		DRILLING RIG CME ATV #383			BORING OFFSET			LONGITUDE				
FIELD LOG BY V. Jones		DRILLING METHOD / HOLE SIZE 3 1/4 HSA			ROADWAY NAME			NORTHING		357743.63		
LOG QC BY B. Broback		HAMMER TYPE Auto	EFFICIENCY 90%	STATION		OFFSET		EASTING		2492035.11		
COUNTY		TOWNSHIP	RANGE	SECTION		1/4 SECTION		1/4 SECTION		SURFACE ELEVATION 917 ft		




[illegible]







End of Boring at 20.0 ft.

WATER & CAVE-IN OBSERVATION DATA






	WATER ENCOUNTERED DURING DRILLING: 8ft.		CAVE DEPTH AT COMPLETION: 10ft.	WET <input type="checkbox"/>
	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: N/A	WET <input type="checkbox"/>
	WATER LEVEL AFTER 0 HOURS: N/A		NE = Not Encountered; NMR = No Measurement Recorded	WET <input type="checkbox"/>

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.




PROJECT NAME Great Water Alliance				BORING LOG						BORING No CC-B-106	
PROJECT No 00521741		CONSULTANT PROJECT No		DATE STARTED 9/22/17		HORIZONTAL DATUM NAVD 29		VERTICAL DATUM NAD 27		PAGE No 1 of 1	
CONSULTANT Greeley-Hansen		DRILLING CONTRACTOR PROJECT No		DATE COMPLETED 9/22/17		LATITUDE		LONGITUDE			
DRILLING CONTRACTOR PSI		DRILLING RIG CME ATV #383		ROADWAY NAME		NORTHING 358418.77		EASTING 2491611.26			
CREW CHIEF S. Briscoe		HAMMER TYPE Auto		EFFICIENCY 90%		STATION		OFFSET			
FIELD LOG BY V. Jones		TOWNSHIP		RANGE		SECTION		1/4 SECTION		1/4 SECTION	
LOG QC BY B. Broback		SURFACE ELEVATION 922 ft									

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	Unconfined Comp. Strength Q_u (tsf)	Unconfined Comp. Strength Q_u (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						Topsoil (4"± Thick)	OL								
1	6	3 4 6	10		920	0.3 (921.7) Fill, Brown and Dark Brown Lean Clay, With Sand and Gravel, Very Moist	CL			0.75	1.40	49	30	19	8
						3 (919) Brown Sandy Lean Clay, With Gravel, Very Moist	CL			2.5	1.81	49	30	25	
2	10	2 3 4	7		5	5.5 (916.5) Brown Silty Sand and Gravel, Moist to Wet	SM								10
3	5	3 5 6	11		915										
4	10	3 6 8	14		10	10.5 (911.5) Light Brown Silty Fine Sand, With Silty Clay and Sand Seams, Wet	SM								10
5	7	8 12 14	26		910										19
6	8	6 8 8	16		15		SM								19
					905										
7	12	6 8 10	18		20	20 (902)									25

End of Boring at 20.0 ft.

WATER & CAVE-IN OBSERVATION DATA					
	WATER ENCOUNTERED DURING DRILLING: 10ft.			CAVE DEPTH AT COMPLETION: 13ft.	WET <input type="checkbox"/>
	WATER LEVEL AT COMPLETION: NE			CAVE DEPTH AFTER 0 HOURS: N/A	WET <input type="checkbox"/>
	WATER LEVEL AFTER 0 HOURS: N/A		NE = Not Encountered; NMR = No Measurement Recorded		WET <input type="checkbox"/>






NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

PROJECT NAME Great Water Alliance				BORING LOG			 		BORING No		CC-B-107	
PROJECT No 00521741									PAGE No		1 of 1	
CONSULTANT Greeley-Hansen		CONSULTANT PROJECT No			DATE STARTED 10/02/17			HORIZONTAL DATUM NAVD 29		VERTICAL DATUM NAD 27		
DRILLING CONTRACTOR PSI		DRILLING CONTRACTOR PROJECT No			DATE COMPLETED 10/02/17			LATITUDE				
CREW CHIEF S. Briscoe		DRILLING RIG Truck #431			BORING OFFSET			LONGITUDE				
FIELD LOG BY V. Jones		DRILLING METHOD / HOLE SIZE 3¼ HSA			ROADWAY NAME			NORTHING 359026.08				
LOG QC BY B. Broback		HAMMER TYPE Auto	EFFICIENCY 90%	STATION		OFFSET		EASTING 2491219.98				
COUNTY		TOWNSHIP	RANGE	SECTION		1/4 SECTION		1/4 SECTION		SURFACE ELEVATION 951 ft		




[illegible]

End of Boring at 20.0 ft.

WATER & CAVE-IN OBSERVATION DATA






	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: 10ft.	WET <input type="checkbox"/>
	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: N/A	WET <input type="checkbox"/>
	WATER LEVEL AFTER 0 HOURS: N/A		NE = Not Encountered; NMR = No Measurement Recorded	WET <input type="checkbox"/>




NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.












PROJECT NAME Great Water Alliance				BORING LOG						BORING No CC-B-108	
PROJECT No 00521741		CONSULTANT PROJECT No		DATE STARTED 10/02/17		HORIZONTAL DATUM NAVD 29		VERTICAL DATUM NAD 27		1 of 1	
CONSULTANT Greeley-Hansen		DRILLING CONTRACTOR PROJECT No		DATE COMPLETED 10/02/17		LATITUDE		LONGITUDE			
DRILLING CONTRACTOR PSI		DRILLING RIG Truck #431		BORING OFFSET		NORTHING 359527.16		EASTING 2490690.17			
CREW CHIEF S. Briscoe		DRILLING METHOD / HOLE SIZE 3 1/4 HSA		ROADWAY NAME		STATION		OFFSET			
FIELD LOG BY V. Jones		HAMMER TYPE Auto		EFFICIENCY 90%		SURFACE ELEVATION 980 ft					
LOG QC BY B. Broback		TOWNSHIP		RANGE		SECTION		1/4 SECTION		1/4 SECTION	
COUNTY											

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	Unconfined Comp. Strength Q _u (tsf)	Unconfined Comp. Strength Q _u (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						Asphalt (5"± Thick)									
1	5	3	11			Aggregate Base, Brown Crushed Sand and Gravel, Moist (4"± Thick)	ML							4	
		6				Fill, Light Brown Sandy Silt and Gravel, Very Moist								8	
		5													
2	7	3	7			Brown Lean Clay, Very Moist to Moist	CL			1.0	1.90			26	
		3													
		4												15	
3	2	3	8												
		4													
		4													
4	10	3	7			Brown Sandy Silt and Gravel, Very Moist	ML							12	
		4													
		3													
5	14	9	43			Light Brown Silty Fine Sand and Gravel, Possible Cobbles and Boulders, Very Moist to Moist								8	
		12													
		31													
6	15	16	63				SM							5	
		31													
		32													
7	10	31	R											7	
		42													
		50/5"													
				20	960										
						20 (960)									

End of Boring at 20.0 ft.






WATER & CAVE-IN OBSERVATION DATA					
	WATER ENCOUNTERED DURING DRILLING: NE			CAVE DEPTH AT COMPLETION: 11ft.	WET <input type="checkbox"/>
	WATER LEVEL AT COMPLETION: NE			CAVE DEPTH AFTER 0 HOURS: N/A	DRY <input type="checkbox"/>
	WATER LEVEL AFTER 0 HOURS: N/A		NE = Not Encountered; NMR = No Measurement Recorded		WET <input type="checkbox"/>
NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.					

PROJECT NAME Great Water Alliance				BORING LOG			 		BORING No		CC-B-109	
PROJECT No 00521741									PAGE No		1 of 1	
CONSULTANT Greeley-Hansen		CONSULTANT PROJECT No			DATE STARTED 9/13/17			HORIZONTAL DATUM NAVD 29		VERTICAL DATUM NAD 27		
DRILLING CONTRACTOR PSI		DRILLING CONTRACTOR PROJECT No			DATE COMPLETED 9/13/17			LATITUDE				
CREW CHIEF S. Briscoe		DRILLING RIG Truck #431			BORING OFFSET			LONGITUDE				
FIELD LOG BY S. Briscoe		DRILLING METHOD / HOLE SIZE 3¼ HSA			ROADWAY NAME			NORTHING 359967.71				
LOG QC BY B. Broback		HAMMER TYPE Auto	EFFICIENCY 90%	STATION		OFFSET	EASTING 2490082.11					
COUNTY		TOWNSHIP	RANGE	SECTION		1/4 SECTION	1/4 SECTION	SURFACE ELEVATION 978 ft				

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	Unconfined Comp. Strength Q _u (tsf)	Unconfined Comp. Strength Q _u (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						Topsoil Fill (3"± Thick)	OL								
1 SS	7	2 2 2	4			0.3 (977.7) Fill, Brown Sandy Lean Clay, With Gravel, Very Moist	CL			1.75				17	
					975	3 (975) Grayish Brown Lean Clay, Very Moist	CL			2.5	1.98			26	
2 SS	9	2 2 3	5		5		CL								
						5.5 (972.5) Light Brown and Gray Mottled to Brown Sandy Silt, With Sand Seams, Wet								14	
3 SS	10	3 3 4	7		970		ML							21	
4 SS	12	4 4 7	11		10	10.5 (967.5) Brown Medium to Coarse Sand and Gravel, With Silt Seams, Wet								17	
5 SS	9	9 10 11	21		965		SW								
6 SS	11	6 7 12	19		15	17 (961) Gray Lean Clay, Trace to With Sand and Gravel, With Silt Lenses, Very Moist								21	
					960		CL								
7 SS	13	10 12 15	27		20	20 (958)								15	

End of Boring at 20.0 ft.

WATER & CAVE-IN OBSERVATION DATA

WATER & CAVE IN OBSERVATION DATA				
	WATER ENCOUNTERED DURING DRILLING: 5.5ft.		CAVE DEPTH AT COMPLETION: 11ft.	WET DRY <input type="checkbox"/>
	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: N/A	WET DRY <input type="checkbox"/>
	WATER LEVEL AFTER 0 HOURS: N/A		NE = Not Encountered; NMR = No Measurement Recorded	




NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.








[illegible]

WATER & CAVE-IN OBSERVATION DATA






000 - GW GEOTECH Great Water Alliance 1/11/18




NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

PROJECT NAME Great Water Alliance				BORING LOG						BORING No CC-B-111	
PROJECT No 00521741		CONSULTANT PROJECT No		DATE STARTED 9/22/17		HORIZONTAL DATUM NAVD 29		VERTICAL DATUM NAD 27		PAGE No 1 of 1	
CONSULTANT Greeley-Hansen		DRILLING CONTRACTOR PROJECT No		DATE COMPLETED 9/22/17		LATITUDE		LONGITUDE			
DRILLING CONTRACTOR PSI		DRILLING RIG CME ATV #383		BORING OFFSET		NORTHING 360854.31		EASTING 2488823.21			
CREW CHIEF S. Briscoe		DRILLING METHOD / HOLE SIZE 3 1/4 HSA		STATION		OFFSET		SURFACE ELEVATION 975 ft			
FIELD LOG BY V. Jones		HAMMER TYPE Auto		EFFICIENCY 90%							
LOG QC BY B. Broback		TOWNSHIP		RANGE		SECTION		1/4 SECTION		1/4 SECTION	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	Unconfined Comp. Strength Q_u (tsf)	Unconfined Comp. Strength Q_u (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						Topsoil (3"± Thick)	OL								
1	6	10 14 18	32			Brown Silty Sand and Gravel, Moist	SM							5	
2	9	13 14 17	31			Brown Medium Sand and Gravel, Moist	SP							3	
				5	970										
3	2	50/5"	R			Light Brown Sandy Silt and Gravel, Possible Cobbles and Boulders, Moist	ML								
4	10	26 50 50/3"	R											6	$P_{10} = 67.3\%$ $P_{60} = 59.5\%$ $P_{200} = 53.4\%$
				10	965										
5	3	27 36 20	56			Light Brown Silty Clay, With Sand, Possible Cobbles and Boulders, Wet	CL-ML							20	
7	4	22 24 30	54			Light Brown Silty Sand, Possible Cobbles and Boulders, Wet	SM								
				15	960										
8	6	24 20 26	46			Brown Sandy Silt, With Gravel, Possible Cobbles and Boulders, Moist	ML							10	
				20	955										

End of Boring at 20.0 ft.






WATER & CAVE-IN OBSERVATION DATA					
	WATER ENCOUNTERED DURING DRILLING: 10.5ft.			CAVE DEPTH AT COMPLETION: 9ft.	
	WATER LEVEL AT COMPLETION: NE			CAVE DEPTH AFTER 0 HOURS: N/A	
	WATER LEVEL AFTER 0 HOURS: N/A		NE = Not Encountered; NMR = No Measurement Recorded		
NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.					

PROJECT NAME Great Water Alliance				BORING LOG			 		BORING No		CC-B-112	
PROJECT No 00521741									PAGE No		1 of 1	
CONSULTANT Greeley-Hansen		CONSULTANT PROJECT No			DATE STARTED 9/21/17			HORIZONTAL DATUM NAVD 29		VERTICAL DATUM NAD 27		
DRILLING CONTRACTOR PSI		DRILLING CONTRACTOR PROJECT No			DATE COMPLETED 9/21/17			LATITUDE				
CREW CHIEF S. Briscoe		DRILLING RIG CME ATV #383			BORING OFFSET			LONGITUDE				
FIELD LOG BY V. Jones		DRILLING METHOD / HOLE SIZE 3 1/4 HSA			ROADWAY NAME			NORTHING 361350.93				
LOG QC BY B. Broback		HAMMER TYPE Auto	EFFICIENCY 90%	STATION		OFFSET	EASTING 2488093.61					
COUNTY		TOWNSHIP	RANGE	SECTION		1/4 SECTION	1/4 SECTION	SURFACE ELEVATION 993 ft				




Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	Unconfined Comp. Strength Q_u (tsf)	Unconfined Comp. Strength Q_c (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					Topsoil Fill (3" \pm Thick) 0.3 (992.7)	OL								
1 SS	6	8 26 50/3"	R		Fill, Brown Silty Sand, With Silt and Clay Pockets, With Crushed Stone, Moist	SM							7	
				990	3 (990)									
2 SS	7	2 4 10	14	5	Light Brown Sandy Silt and Gravel, Trace Clay, Very Moist								9	
3 SS	10	3 7 10	17			ML							10	
				985										
4 SS	12	4 6 10	16	10									10	
5 SS	14	4 6 7	13		Gray Sandy Silt and Gravel, Trace Clay, Very Moist to Wet 11.5 (981.5)								11	
				980										
7 SS	15	5 7 8	15	15									13	
						ML								
				975										
8 SS	12	5 6 7	13	20	20 (973)								9	








Boring offset 10' east due to below grade gas line
End of Boring at 20.0 ft.

WATER & CAVE-IN OBSERVATION DATA

	WATER ENCOUNTERED DURING DRILLING: 13ft.		CAVE DEPTH AT COMPLETION: 11ft.	WET <input type="checkbox"/>
	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: N/A	WET <input type="checkbox"/>
	WATER LEVEL AFTER 0 HOURS: N/A		NE = Not Encountered; NMR = No Measurement Recorded	WET <input type="checkbox"/>






NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

PROJECT NAME Great Water Alliance				BORING LOG			 		BORING No		CC-B-113	
PROJECT No 00521741									PAGE No		1 of 1	
CONSULTANT Greeley-Hansen		CONSULTANT PROJECT No			DATE STARTED 9/19/17			HORIZONTAL DATUM NAVD 29		VERTICAL DATUM NAD 27		
DRILLING CONTRACTOR PSI		DRILLING CONTRACTOR PROJECT No			DATE COMPLETED 9/19/17			LATITUDE				
CREW CHIEF S. Briscoe		DRILLING RIG CME ATV #383			BORING OFFSET			LONGITUDE				
FIELD LOG BY V. Jones		DRILLING METHOD / HOLE SIZE 3 1/4 HSA			ROADWAY NAME			NORTHING 361870.38				
LOG QC BY B. Broback		HAMMER TYPE Auto	EFFICIENCY 90%	STATION		OFFSET	EASTING 2487407.94					
COUNTY		TOWNSHIP	RANGE	SECTION		1/4 SECTION	1/4 SECTION	SURFACE ELEVATION 962 ft				

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	Unconfined Comp. Strength Q _u (tsf)	Unconfined Comp. Strength Q _c (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					Topsoil Fill (6"± Thick)	OL								
1 SS	7	1 1 2	3	960	0.5 (961.5) Fill, Brown and Light Brown Sandy Lean Clay, With Sandy Silt Pockets, With Gravel, Very Moist	CL			0.25	0.49			9	P ₁₀ = 54.4% P ₆₀ = 37.8% P ₂₀₀ = 26.4%
					3 (959) Fill, Brown Sandy Silt, With Gravel, Moist	ML							21	
2 SS	1	2 2 3	5	5									7	
					5.5 (956.5) Light Brown Silty Fine Sand and Gravel, Moist to Very Moist	SM							8	
3 SS	9	20 16 18	34	955									8	
					10.5 (951.5) Brown Sandy Silt and Gravel, Possible Cobbles and Boulders, Moist to Very Moist								8	
4 SS	6	11 9 12	21	10									8	
					12 14 16	30							9	
5 SS	5	12 14 16	30	950									9	
					16 50/3"	R								
6 SS	12	16 50/3"	R	15		ML								
					17 (945) Light Brown Silty Fine Sand and Gravel, Possible Cobbles and Boulders, Moist	SM								
7 SS	5	28 50/2"	R	20										
					20 (942)									

Boring offset from pavement to the shoulder due to safety concerns
End of Boring at 20.0 ft.

WATER & CAVE-IN OBSERVATION DATA

	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: 13ft.	WET <input type="checkbox"/>
	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: N/A	WET <input type="checkbox"/>
	WATER LEVEL AFTER 0 HOURS: N/A		NE = Not Encountered; NMR = No Measurement Recorded	WET <input type="checkbox"/>




NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	Unconfined Comp. Strength Q_u (tsf)	Unconfined Comp. Strength Q_c (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					Topsoil Fill (6"± Thick)	OL								
1 SS	5	3 3 3	6		Possible Fill, Brown Sandy Lean Clay, With Gravel, Very Moist	CL			3.0				15	
				940	Brown Sandy Silt, With Gravel, Very Moist	ML							12	
2 SS	10	4 4 4	8	5	Light Brown Medium Sand and Gravel, Damp	SP							3	
3 SS	8	8 15 28	43		Light Brown Silty Fine Sand and Gravel, Possible Cobbles and Boulders, Damp	SM							4	
4 SS	9	12 18 50/3"	R	10	Light Brown Medium Sand and Gravel, Possible Cobbles and Boulders, Damp to Moist	SP							2	
5 SS	16	20 34 46	80											
7 SS	8	20 46 50/5"	R	15									3	
8 SS	13	10 30 31	61	20	Brown Coarse Sand and Gravel, With Silt Lenses, Possible Cobbles and Boulders, Wet	SP							9	

WATER & CAVE-IN OBSERVATION DATA

00 - GW GEOTECH Great Water Alliance 1/11/18






NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

PROJECT NAME Great Water Alliance				BORING LOG			 		BORING No CC-B-115	
PROJECT No 00521741									PAGE No 1 of 1	
CONSULTANT Greeley-Hansen		CONSULTANT PROJECT No			DATE STARTED 9/19/17			HORIZONTAL DATUM NAVD 29		VERTICAL DATUM NAD 27
DRILLING CONTRACTOR PSI		DRILLING CONTRACTOR PROJECT No			DATE COMPLETED 9/19/17			LATITUDE		
CREW CHIEF S. Briscoe		DRILLING RIG CME ATV #383			BORING OFFSET			LONGITUDE		
FIELD LOG BY V. Jones		DRILLING METHOD / HOLE SIZE 3¼ HSA			ROADWAY NAME			NORTHING 362921.84		
LOG QC BY B. Broback		HAMMER TYPE Auto	EFFICIENCY 90%		STATION		OFFSET	EASTING 2486169.97		
COUNTY		TOWNSHIP	RANGE	SECTION		1/4 SECTION		1/4 SECTION		SURFACE ELEVATION 971 ft




[illegible]

End of Boring at 20.0 ft.

WATER & CAVE-IN OBSERVATION DATA

	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: 12ft.	WET <input type="checkbox"/> DRY <input type="checkbox"/>
	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: N/A	WET <input type="checkbox"/> DRY <input type="checkbox"/>
	WATER LEVEL AFTER 0 HOURS: N/A	NE = Not Encountered; NMR = No Measurement Recorded		






NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

PROJECT NAME Great Water Alliance				BORING LOG			 		BORING No		CC-B-116	
PROJECT No 00521741									PAGE No		1 of 1	
CONSULTANT Greeley-Hansen		CONSULTANT PROJECT No			DATE STARTED 9/13/17			HORIZONTAL DATUM NAVD 29		VERTICAL DATUM NAD 27		
DRILLING CONTRACTOR PSI		DRILLING CONTRACTOR PROJECT No			DATE COMPLETED 9/13/17			LATITUDE				
CREW CHIEF S. Briscoe		DRILLING RIG Truck #431			BORING OFFSET			LONGITUDE				
FIELD LOG BY V. Jones		DRILLING METHOD / HOLE SIZE 3¼ HSA			ROADWAY NAME			NORTHING 363348.71				
LOG QC BY B. Broback		HAMMER TYPE Auto	EFFICIENCY 90%	STATION		OFFSET	EASTING 2485549.79					
COUNTY		TOWNSHIP	RANGE	SECTION		1/4 SECTION	1/4 SECTION	SURFACE ELEVATION 973 ft				




[illegible]









End of Boring at 20.0 ft.

WATER & CAVE-IN OBSERVATION DATA






	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: 10ft.	WET <input type="checkbox"/>
	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: N/A	WET <input type="checkbox"/>
	WATER LEVEL AFTER 0 HOURS: N/A		NE = Not Encountered; NMR = No Measurement Recorded	WET <input type="checkbox"/>




NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.





PROJECT NAME Great Water Alliance				BORING LOG						BORING No CC-B-117	
PROJECT No 00521741		CONSULTANT PROJECT No		DATE STARTED 9/15/17		HORIZONTAL DATUM NAVD 29		VERTICAL DATUM NAD 27		PAGE No 1 of 1	
CONSULTANT Greeley-Hansen		DRILLING CONTRACTOR PROJECT No		DATE COMPLETED 9/15/17		LATITUDE		LONGITUDE			
DRILLING CONTRACTOR PSI		DRILLING RIG Truck #431		ROADWAY NAME		NORTHING 363851.72		EASTING 2484908.09			
CREW CHIEF S. Briscoe		HAMMER TYPE Auto		EFFICIENCY 90%		STATION		OFFSET			
FIELD LOG BY V. Jones		TOWNSHIP		RANGE		SECTION		1/4 SECTION		1/4 SECTION	
LOG QC BY B. Broback		SURFACE ELEVATION 963 ft									

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	Unconfined Comp. Strength Q_u (tsf)	Unconfined Comp. Strength Q_u (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						Topsoil Fill (5"± Thick)	OL								
1	6	4 5 8	13		960	Fill, Brown Sandy Lean Clay, With Gravel, Moist	CL							12	
2	8	4 6 5	11	5		Light Brown Silty Sand and Gravel, Possible Cobbles and Boulders, Moist to Wet								9	
3	4	6 8 17	25		955									8	
4	0	28 46 50/4"	R	10											
5	0	30 28 32	60		950		SM								
6	8	26 30 40	70	15										7	
7	2	36 50/3"	R		945										
				20			20 (943)								

Boring offset 10' east due to below grade gas main
End of Boring at 20.0 ft.






WATER & CAVE-IN OBSERVATION DATA					
	WATER ENCOUNTERED DURING DRILLING: 17ft.			CAVE DEPTH AT COMPLETION: 9ft.	WET <input type="checkbox"/>
	WATER LEVEL AT COMPLETION: NE			CAVE DEPTH AFTER 0 HOURS: N/A	DRY <input type="checkbox"/>
	WATER LEVEL AFTER 0 HOURS: N/A		NE = Not Encountered; NMR = No Measurement Recorded		WET <input type="checkbox"/>
NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.					

PROJECT NAME Great Water Alliance				BORING LOG						BORING No CC-B-118	
PROJECT No 00521741		CONSULTANT PROJECT No		DATE STARTED 10/02/17		HORIZONTAL DATUM NAVD 29		VERTICAL DATUM NAD 27		PAGE No 1 of 1	
CONSULTANT Greeley-Hansen		DRILLING CONTRACTOR PROJECT No		DATE COMPLETED 10/02/17		LATITUDE		LONGITUDE			
DRILLING CONTRACTOR PSI		DRILLING RIG Truck #431		ROADWAY NAME		NORTHING 364353.56		EASTING 2484314.05			
CREW CHIEF S. Briscoe		HAMMER TYPE Auto		EFFICIENCY 90%		STATION		OFFSET		SURFACE ELEVATION 953 ft	
FIELD LOG BY V. Jones		TOWNSHIP		RANGE		SECTION		1/4 SECTION		1/4 SECTION	
LOG QC BY B. Broback											




Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	Unconfined Comp. Strength Q_u (tsf)	Unconfined Comp. Strength Q_u (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
1 SS	5	8 8 4	12		950	Asphalt (5"± Thick) 0.4 (952.6) Aggregate Base, Brown Crushed Sand and Gravel, Moist (4"± Thick) 0.8 (952.2) Fill, Brown Sand and Gravel, With Silty Sand Pockets, Moist 3 (950)	SP							2	
2 SS	6	6 4 6	10	5		Fill, Light Brown and Brown Sandy Silt and Gravel, With Clay Pockets, Very Moist	ML							10	
3 SS	9	3 4 3	7		945	8 (945) Brown Lean Clay, Trace Sand and Gravel, Very Moist	CL		1.25					21	
4 SS	7	2 3 3	6	10		10.5 (942.5) Brown to Light Brown Medium Sand and Gravel, Possible Cobbles and Boulders, Moist	SP							5	
5 SS	10	2 2 2	4		940									4	
6 SS	6	9 5 10	15	15										3	
7 SS	12	8 30 50/3"	R		935										
				20		20 (933)									





Boring offset 10' east due to shoulder
End of Boring at 20.0 ft.

WATER & CAVE-IN OBSERVATION DATA






	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: 9ft.	WET <input type="checkbox"/>
	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: N/A	WET <input type="checkbox"/>
	WATER LEVEL AFTER 0 HOURS: N/A		NE = Not Encountered; NMR = No Measurement Recorded	WET <input type="checkbox"/>

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

PROJECT NAME Great Water Alliance				BORING LOG						BORING No CC-B-119	
PROJECT No 00521741		CONSULTANT PROJECT No		DATE STARTED 9/15/17		HORIZONTAL DATUM NAVD 29		VERTICAL DATUM NAD 27		PAGE No 1 of 1	
CONSULTANT Greeley-Hansen		DRILLING CONTRACTOR PROJECT No		DATE COMPLETED 9/15/17		LATITUDE		LONGITUDE			
DRILLING CONTRACTOR PSI		DRILLING RIG Truck #431		ROADWAY NAME		NORTHING 364799.64		EASTING 2483727.19			
CREW CHIEF S. Briscoe		HAMMER TYPE Auto		EFFICIENCY 90%		STATION		OFFSET		SURFACE ELEVATION 921 ft	
FIELD LOG BY V. Jones		TOWNSHIP		RANGE		SECTION		1/4 SECTION		1/4 SECTION	
LOG QC BY B. Broback		SECTION		1/4 SECTION		1/4 SECTION		1/4 SECTION		1/4 SECTION	
COUNTY		TOWNSHIP		RANGE		SECTION		1/4 SECTION		1/4 SECTION	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	Unconfined Comp. Strength Q_u (tsf)	Unconfined Comp. Strength Q_u (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					920	Topsoil (4"± Thick)	OL								
1	6	4	8			Brown Lean Clay, Trace Sand and Gravel, Moist	CL			4.5				19	
2	8	4	9											11	
				5											
					915	Brown to Light Brown Silty Sand and Gravel, Possible Cobbles and Boulders, Moist to Very Moist									
3	5	10	21												
4	9	14	30		10									8	
					910										
5	12	18	56				SM							7	
6	14	24	73		15									6	
					905										
7	10	12	84											7	
					20										
						20 (901)									

End of Boring at 20.0 ft.

WATER & CAVE-IN OBSERVATION DATA					
	WATER ENCOUNTERED DURING DRILLING: NE			CAVE DEPTH AT COMPLETION: 9ft.	WET <input type="checkbox"/>
	WATER LEVEL AT COMPLETION: NE			CAVE DEPTH AFTER 0 HOURS: N/A	WET <input type="checkbox"/>
	WATER LEVEL AFTER 0 HOURS: N/A		NE = Not Encountered; NMR = No Measurement Recorded		WET <input type="checkbox"/>
NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.					



GREELEY AND HANSEN

741 N. Grand Ave., Suite 308
Waukesha, WI 53186